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THE FOUNDRY

A TRADE JOURNAL

DEVOTED TO THE INTERESTS OF THE WHOLE FOUNDRY BUSINESS

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FEBRUARY 10, 1893.

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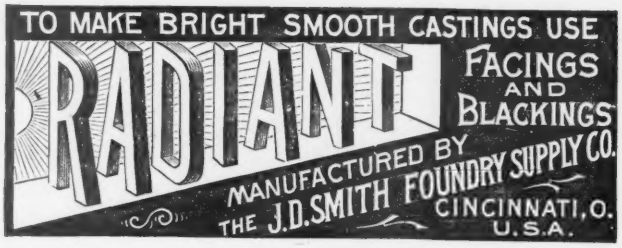
DETROIT, MICH.

B.S.

10,000 BARRELS SOLD IN 1892.



A Facing or Blacking to be satisfactory for all kinds of castings HAS TO BE A GOOD ONE, and, although every manufacturer of Foundry Facings claims to make it, we can truthfully state that before RADIANT was introduced, the foundryman in general was trying every Facing he was asked to try, with no uniform succeess, and the foundryman who has never tried RADIANT is still looking for something satisfactory, and we are still looking for this individual, to tell him about the only successful, uniformly, satisfactory Facing in the market.

Are you buying three or four kinds of heavy bag facings besides a core wash? Yes, well we tell you that RADIANT Facing or Blacking will take the place of *all* of them, and the castings on which it is used will be more satisfactory than ever before. Not only can RADIANT Facing or Blacking make your castings more beautiful in color or appearance, and save you money by buying less facing, but, with its use, you will find the castings separate from the sand with a touch and the cleaning of castings almost wholly left to the "Chipper". RADIANT Facing or Blacking will answer for every job you put in the sand, from the smallest to the largest and heaviest work, and when mixed with water will make as good a wash ss you can buy for the price.

A Facing or Blacking to do all this must not stick to the trowel in slicking, must not wash or run in pouring, must peel clean and leave a smooth face casting; such a Facing or Blacking must be composed of material that will stand the iron whether it is poured hot or otherwise, in large or small quantities, therefore it must be entirely fire proof and stand a fire test of 2000 to 4000 degrees of heat. It must absorb the moisture, therefore must be finely ground and porous, and to slick well must not be sticky. Combined with all these necessary qualities the Facing or Blacking must peel easily from the castings and make a good color. It has been the work of a life time to get all these qualities combined into one Facing or Blacking but we have succeeded and RADIANT Facing or Blacking is the result.

We want everyone who has never used it to try it and be convinced. We will willingly send a liberal trial sample free of charge, or ship a barrel, and if all we claim for it is not proven on trial, will take it back free of expense to you. Do not be misled by competitors claiming to have something equally as good, nearly every Facing manufacturer in the country is making a Facing, which they call a name similar in sound or meaning to the word RADIANT; "Imitation is the best recommendation". Its reputation is firmly established and was made alone on the uniform superior quality, and from the fact that it is, and always has been, just as represented.

—— MANUFACTURED ONLY BY ——

The J. D. Smith Foundry Supply Co.

CINCINNATI, O., U. S. A.

10,000,000
Barrels
Of
Peerless
Facings
Sold
In
1892
Is
Significant
Enough
It
Tells
A Big
Lie
In
Few
Words

What's the necessity of being stingy in the use of ciphers; "Printers' Ink is Cheap." While we are making claims, we may as well be liberal about it. A truce to levity however.

THE FOLLOWING "GOES."

"A Thing of Beauty is a Joy Forever."

To obtain such in all Kinds of Castings, use appropriately

Peerless Plumbago or India Silver Lead

A PURE, PERFECT AND

PEERLESS BLACKING

For all kinds of Castings which may be brushed, dusted and rubbed on the molds with hands. It is also a

PEERLESS WASH

on Dry Sand, Core and Loam Work, also for Steel Castings and large Bells.
We manufacture the

Peerless Dry Lubricator + + +

Also the UNIVERSAL favorites,

Peerless Facing and Blacking

For Brass, Fine Bronze and Special Castings.

Peerless Facing and Blacking

For Fine Stove Plate and Piano Castings.

Peerless Heavy Machine Facing and Blacking

WHICH IS

PEERLESS

In all that this name implies for the purpose.

"Peerless" Trial Samples

Free of Charge. State nature of work when Ordering.

—)THE(—

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CHICAGO, ILLS., U. S. A.

IMPORTERS AND REFINERS OF

Graphite or Plumbago, Silver Lead, and dealers in all Kinds of Foundry Supplies.

Do You Want to make Big Money in '93?

THERE IS ONLY ONE WAY TO DO IT,

Turn out Nice, Bright, Smooth Castings from the Molds and Save Expense of Dressing, Cleaning and Scraping same Afterwards.

OBERMAYER'S GOODS WILL DO IT!!

SEND FOR CATALOGUE.

THE S. OBERMAYER Co

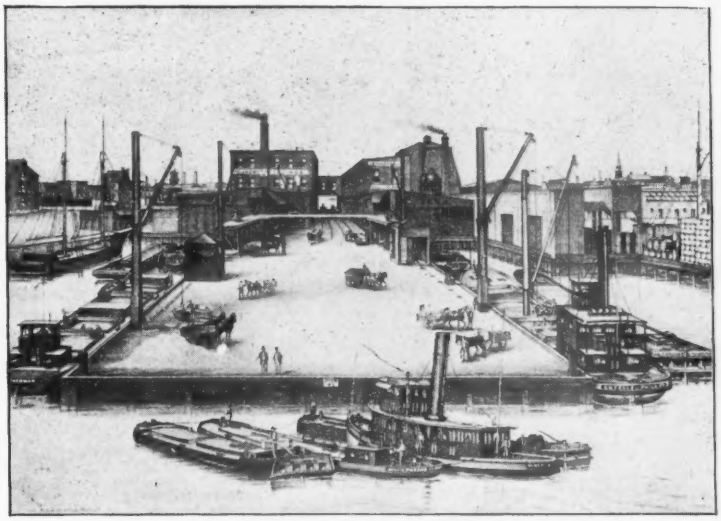
—MANUFACTURERS—

Foundry Facings, Supplies and Equipments.

CINCINNATI, - - - OHIO.

ESTABLISHED 1856.

Quaker City Facing Mills.



This cut shows our Sand Dock, Boats, Etc.

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OF ALL BRANDS.

INDIA AND SILVER LEAD AND PLUMBAGO.

WE MAKE THE FOLLOWING:

Brass Iron, Steel and Galvanized Iron Riddles, Scratch Brushes, Wire-Cloth, Bristle Brushes, Bellows, Hay-Rope, Etc.

GROUND SILICA ROCK, + + + +

STEEL MOLD WASH,

+ + MOLDING SANDS, CORE GRAVEL. ETC.

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PHILADELPHIA, PA.

WHITEHEAD BROTHERS COMPANY,

——DEALERS IN——

Moulding Sand, Fire Sand,
Philadelphia Sand, French Sand,
Fire Clay, Kaolin, and Foundry
Facings and Supplies of all Kinds,
Lead Facings a Specialty.

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BUFFALO OFFICE:
70 and 72 Columbia St.

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South River, N. J.
Raritan River, N. J.
South Amboy, N. J.
Wareham, Mass.
Centre Island, L. I.
Waterford, N. Y.
Albany, N. Y.
Cedar Hill, N. Y.
Coxsackie, N. Y.
Clinton Point, N. Y.
Athens, N. Y.
Coeymans, N. Y.
Willow Springs, N. Y.
Poughkeepsie, N. Y.
Crescent, N. Y.

ESTABLISHED 1868. **INCORPORATED 1884.**

THE

FOUNDRY SUPPLY CO.

OF BOSTON, MASS.

Manufacturers of and Dealers in

Every Description of Iron and Brass Founders Equipment and Supplies.

Cupola Furnaces	Shovels,	Facings,	Rammers, Hand & Long
Brushes,	Cranes,	Forks,	Sea Coal,
Steel Wire,	Ladles,	Riddles,	Silver Lead,
Soft Wire,	Tools of all Kinds,	Prints Back,	Steel Brooms,
Crucibles,	Charcoal,	Mineral,	Pattern Brushes,
Dusting Brushes,	Swabs.		

Moulding Sand, Fire Sand and Clay.

BANKS AT

Selkirk, Scotia, Jonesville, South Amboy,
Stillwater, Schenectady, Mechanicsville,
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Cargo and Carload Shipments direct from Banks.

ESTIMATES for complete outfit for Iron or Brass Founders given on receipt of number of molders proposed on both floor and bench. We keep in Stock a Complete Assortment of Supplies. Flour and Patent Clamps, Greens Snap Flask, Iron Flasks for Brass Founders, Fire Bricks, and Koalin.

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FRASER & CHALMERS,
FULTON AND UNION STS.
CHICAGO.
H. P. YOUNG, PURCHASING AGENT.

Nov. 28, 1892.

Messrs. Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--Replying to your favor of the 18th concerning your C. F. M. Founders' Perfect Wash, I have had this matter up with Mr. Ferguson, Supt. of our foundry, and, as a result, can say that we have used the Cleveland Perfect Wash for two years, and for all purposes our foreman thinks it is the best blacking he has ever used. Yours truly,

H. P. YOUNG,
Purchasing Agent.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--We have tried your Perfect Wash and find it as its name indicates. Please ship us two barrels more, and oblige, Yours truly,

McINTOSH, SEYMOUR & CO,
Auburn, N. Y.

. . . . . .

Cleveland Facing Mills,
Cleveland, O.

Gentlemen:--Please ship 40 bbl. of your Founders' Perfect Wash, quality as last.

EDW. P. ALLIS & CO.
Milwaukee, Wis.

C. F. M. FOUNDERS' PERFECT WASH

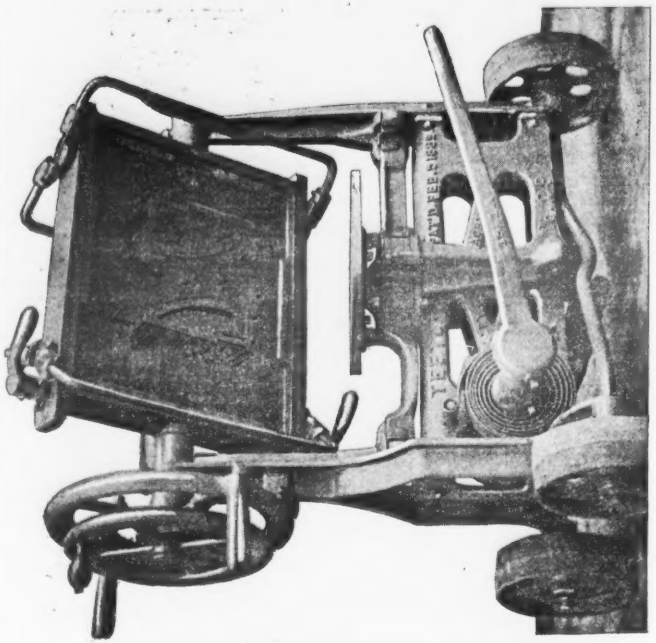
IS MADE ONLY BY

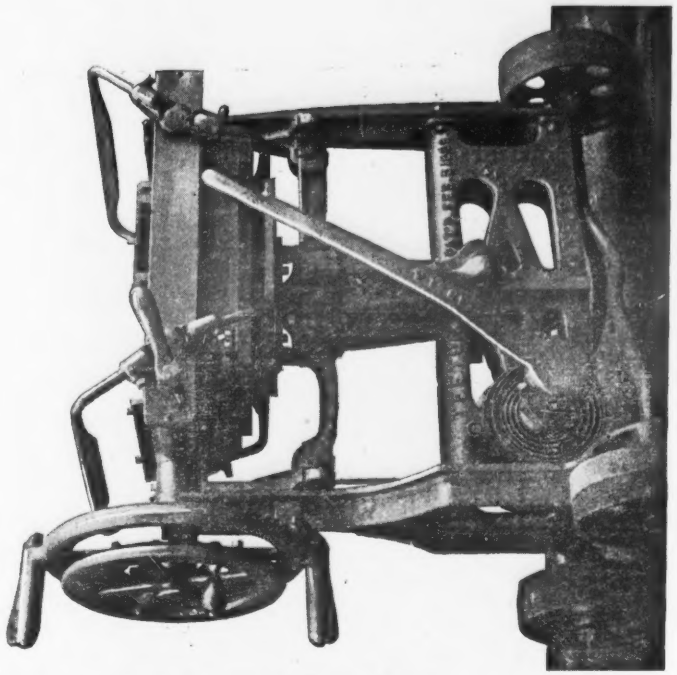
CLEVELAND FACING MILLS,

—Manufacturers of all Kinds of—

Foundry Facings, Blackings & Supplies.

CLEVELAND, OHIO.





TEETOR MOLDING MACHINE.

Large Numbers are in Use in some of the principal Foundries in the Country.

—MANUFACTURED BY—

TEETOR MOLDING MACHINE Co.

Write for Catalogue, Testimonials, Etc.

INDIANAPOLIS, IND.

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Burlington & Missouri River R. R. in Neb.
Hannibal & St. Joseph R. R.
Kansas City, St. Joseph & Council Bluffs R. R.
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Over 7,000 Miles of Railroad Under One Management.

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OPPORTUNITIES, RESOURCES, ASSISTANCE.—THE BURLINGTON ROUTE reaches with its own line nearly every place of note in ILLINOIS, IOWA, MINNESOTA, MISSOURI, NEBRASKA, KANSAS, DAKOTA, WYOMING, COLORADO, and has direct connections to every point in America.

EVERY CONCEIVABLE RESOURCE in the shape of RAW MATERIAL, such as IRON ORE, COAL, COPPER, ZINC, TIN, GOLD and SILVER and OTHER METALS; thousands upon thousands of miles of forests, containing almost unlimited quantities of HARD and SOFT WOODS; CLAYS OF ALL KINDS AND FOR EVERY PURPOSE; inexhaustible stone quarries of every description: immense quantities of TAN BARK, Flax Straw, in fact, everything that is found in the ground or above the ground can almost surely be found somewhere on the vast BURLINGTON ROUTE.

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There are more Manufacturing Industries located on the lines of THE BURLINGTON ROUTE than on any other railroad in the United States.

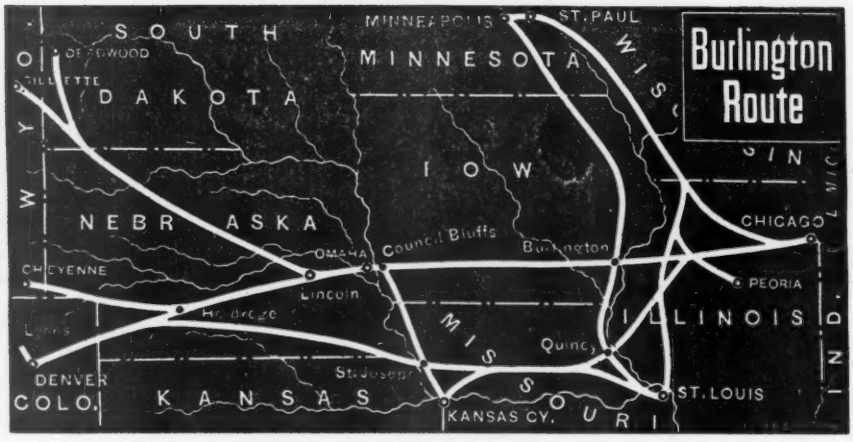
The interests of THE BURLINGTON ROUTE AND THOSE OF A MANUFACTURER OR LOCATER UPON ITS LINES, ARE MUTUAL.

THE INDUSTRIAL DEPARTMENT of this road possesses the information you want. If not, it will procure it for you without any cost to you. This Department is as complete as any Railroad Industrial Department in the world. Will appreciate any correspondence requesting information, etc.

This Department will make the work and worry of seeking a suitable and advantageous location easy for you.

For detailed information and for large county maps of the territory covered by the Burlington lines write to, or call upon **GEO. H. ROSS, Superintendent, INDUSTRIAL DEPARTMENT BURLINGTON ROUTE, General Offices, ADAMS AND FRANKLIN STREETS, CHICAGO.**

THE BEST RAILWAY.



FROM CHICAGO AND ST. LOUIS TO ST. PAUL, MINNEAPOLIS, OMAHA, KANSAS CITY, DENVER,

And all Points in Colorado, Utah and California.

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A large, handsome Map of the United States, mounted and suitable for office or home use, is issued by the Burlington Route. Copies will be mailed to any address on receipt of twelve cents in postage by P. S. EUSTIS, Gen'l Pass. Agt., C., B. & Q. R. R, Chicago, Ill.

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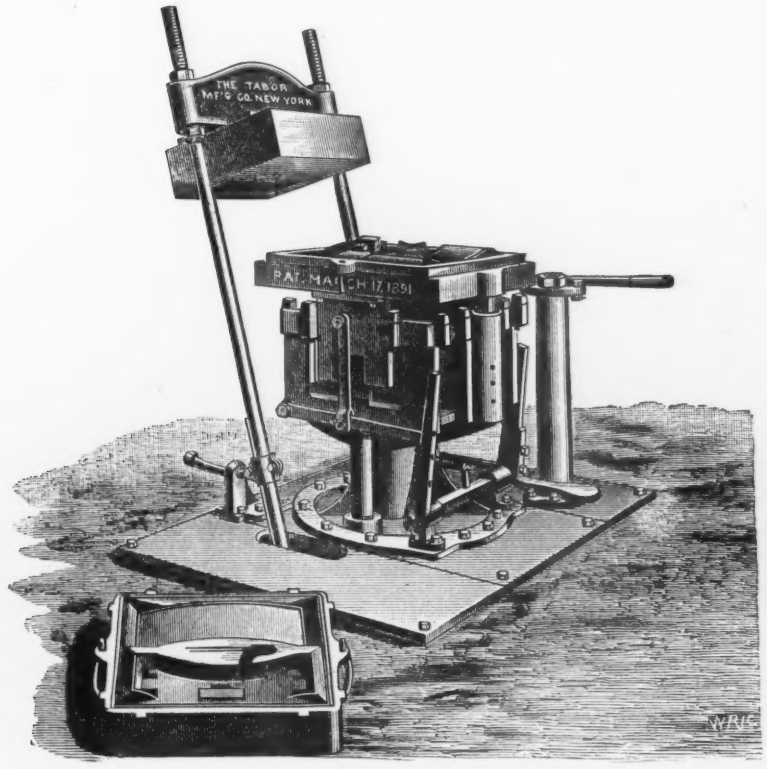
You can obtain a pack of best quality playing cards by sending fifteen cents in postage to P. S. EUSTIS, Gen'l Pass. Agt., C., B. & Q. R. R., Chicago, Ill.

The Tabor Manufacturing Co.,

—MANUFACTURERS OF—

AUTOMATIC MOLDING MACHINES

For Sand Molds for Metal Castings.



These machines are adapted to general castings when made in reasonable quantities.

The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth, N. J., and see the machines in operation.

111 and 113 Liberty Street,

NEW YORK, - - - N. Y.

"Lucigen"

The Cheapest and Best System in Use for Lighting

FOUNDRIES,
FORGES,
ROLLING-MILLS,
OPEN MINES,
ORE DOCKS,
MILL-YARDS.
STEAM-SHOVELS,
MACHINE SHOPS,
SHIP-YARDS,
ROUND-HOUSES,
WRECKING-PLANTS,
ETC., ETC., ETC.

"Lima-crude" or any petroleum oil (crude, refined or distilate), is sprayed by means of compressed air, and burned in that condition; yielding a clear, smokeless flame of a thousand candle power per hour on a consumption of a gallon of the cheapest oil that is accessible. At that trifling cost of maintenance, the illumination can be continued for years without half the attention that an ordinary house lamp will require. Many and various important business concerns in this country have had our system of lighting in use during the last four years and to their proprietors, we are privileged to refer.

Burners of from 300 to 3000 candle power are carried in stock, and orders within that range can be filled at once. Estimates for lighting extensive works will be made on request.

Illustrated catalogues showing various styles of burners are subject to call.

Agents at various points will give personal attention to the erection and starting up of any extensive plant.

INDUSTRIAL LIGHT CO.

SOLE MANUFACTURERS,

Aldrich Court, 45 Broadway,

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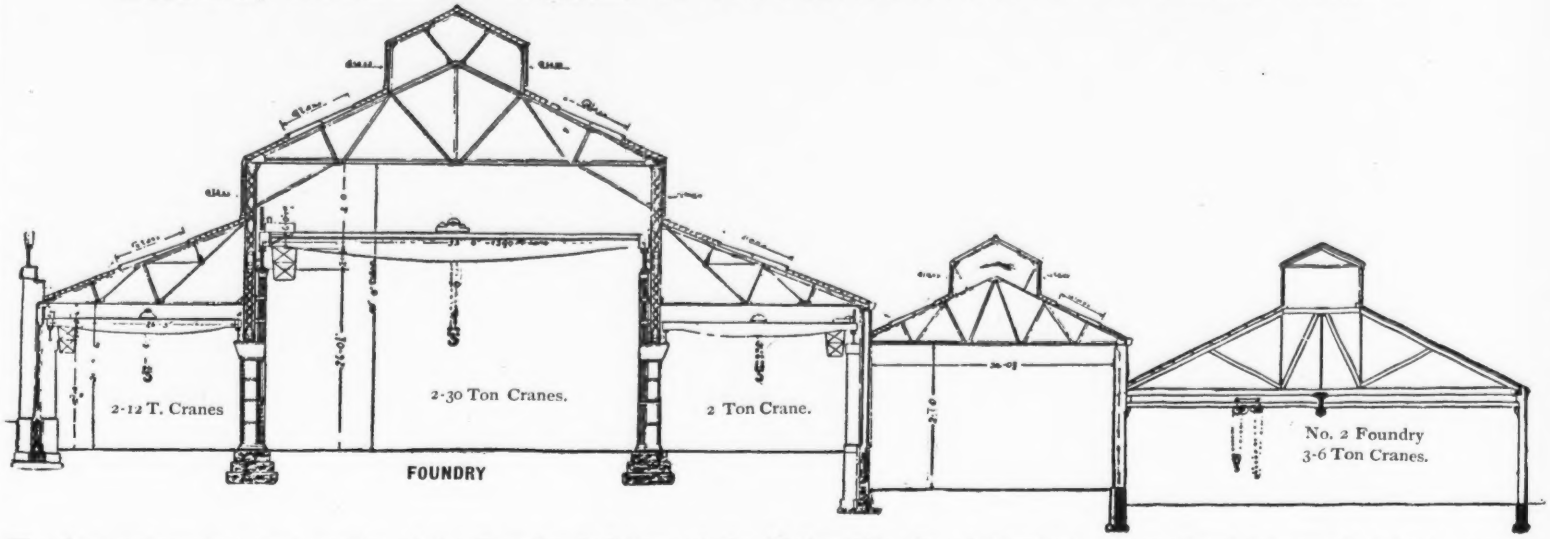
THE VARIETY IRON WORKS,

CLEVELAND, OHIO.

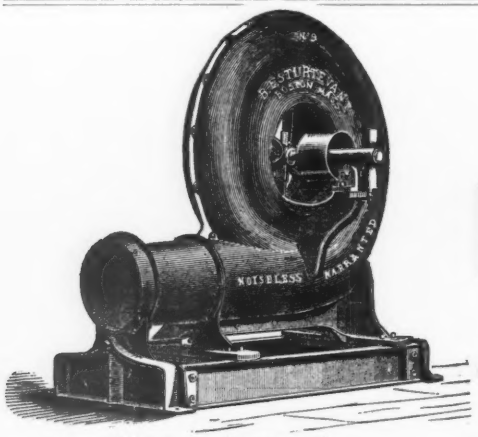
Iron Buildings, Roofs and Trusses

OF EVERY DESCRIPTION.

BOILERS, CUPOLAS and CRAINES OF MODERN DESIGN and BEST WORKMANSHIP.



The above represents a cross section of the Foundry Buildings of the Walker Mfg. Co. of Cleveland, O. considered by experts to be the most modern and best constructed foundry in the world. Erected by us.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

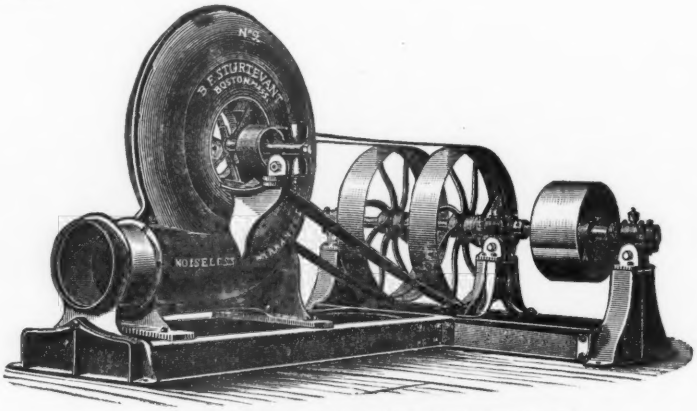
—FOR—

Cupola Furnaces and Forge Fires.

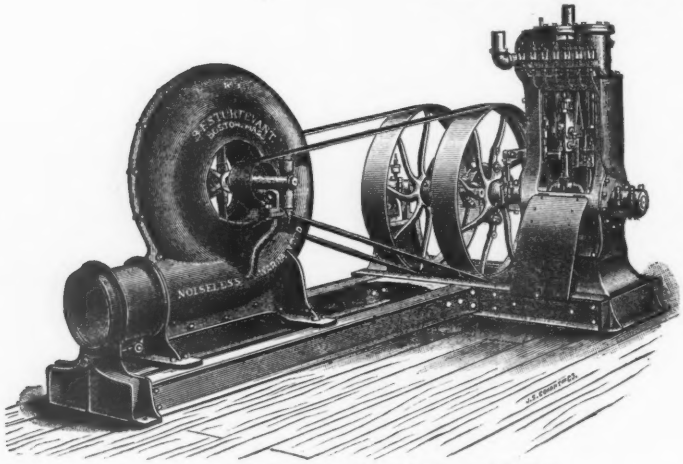
BLOWERS

Furnished without Bed with Separate Countershaft.

BLAST GATES.



Blower on Adjustable Bed with Cmbined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors.

Send for Catalogue.

B. F. STURTEVANT CO.,

BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
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STOCK CARRIED AT BRANCHES.

The Buffalo Steel Pressure Blower

FOR CUPOLA FURNACES, FORGE FIRES, ETC., ETC.

—BUILT ON—

Adjustable Bed Combined with Countershaft,

—ALSO WITH—

DOUBLE UPRIGHT ENCLOSED ENGINE.

BUFFALO FORGE CO.,

Send for Catalogue "F" 1892. BUFFALO, N. Y.

The Huyett & Smith Mfg. Co

DETROIT, MICH.

MANUFACTURERS OF

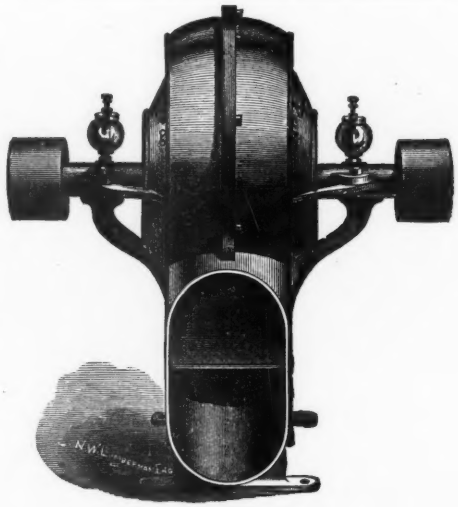
Forge & Pressure Blowers

Made for use in any position, and will produce any desired pressure.

Are combined with adjustable Bed and Engine, or Adjustable Bed and Counter Shaft.

All Sizes Kept in Stock.

Prices and Catalogues furnished on Application.



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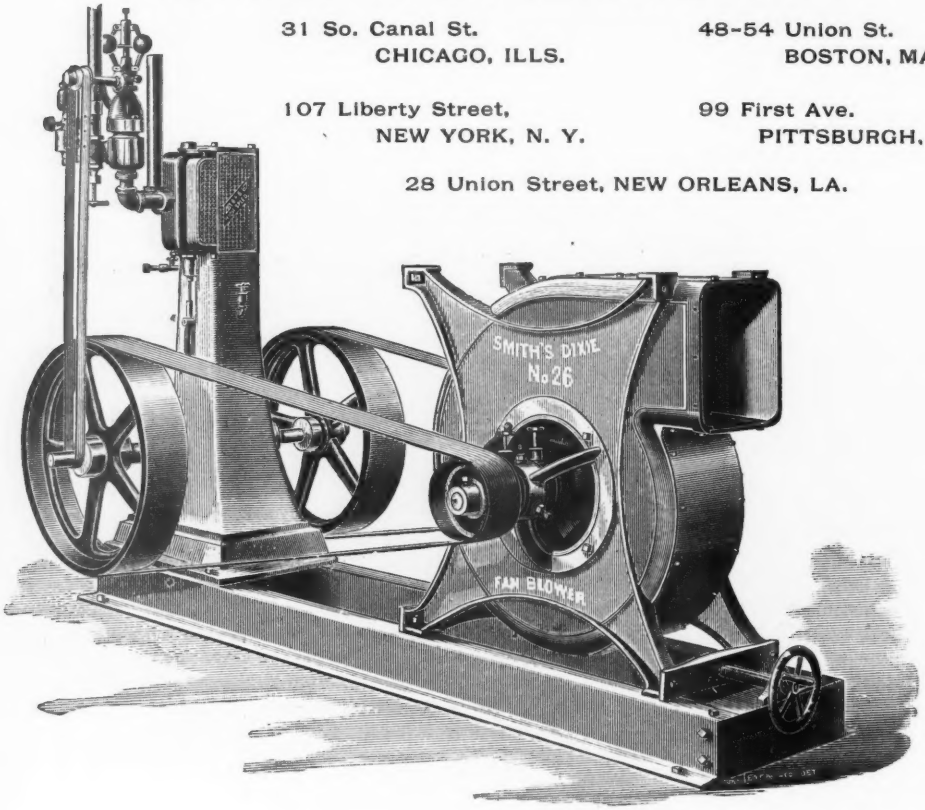
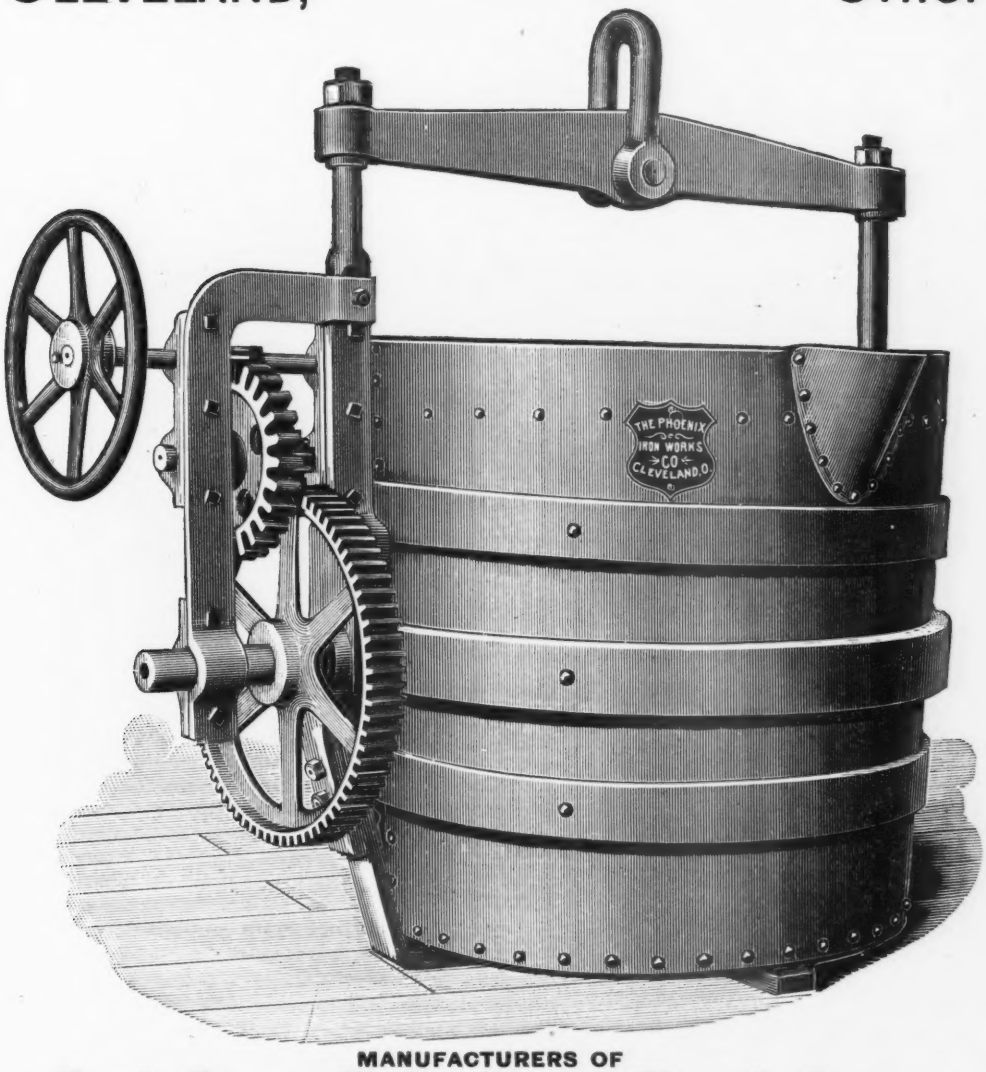


T. H. BROOKS, Pres. W. H. SHEPARD, Vice-Pres & Treas. L. C. SHIPHERD, Sec'y.
W. RUSSELL, Mgr.

The Phœnix Iron Works Co.

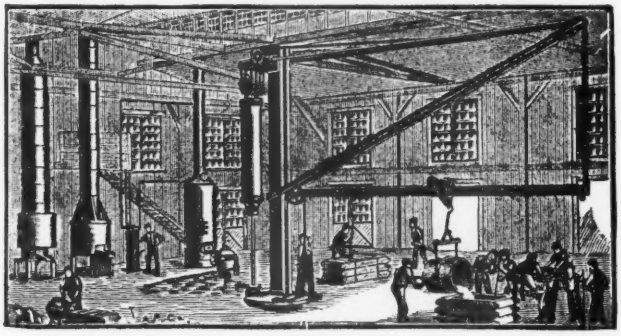
WASON STREET,
Between St. Clair and Superior Streets.
CLEVELAND, - - OHIO.



MANUFACTURERS OF
Hand, Steam, Hydraulic and Electric Cranes,
FOR ALL PURPOSES.
FOUNDRY LADLES, CHAINS & GENERAL MACHINERY.
Correspondence Solicited. Write for Catalogue.

COMPRESSED AIR HOISTS. STEAM HYDRAULIC STOCK ELEVATORS.

Ridgway Balanced Steam Hydraulic Crane.



Cut shows 5 ton Crane in Foundry of Diamond State Iron Co., Wilmington, Del.

THE GREATEST FOUNDRY CRANE KNOWN.

The Latest New Foundry to Adopt this Crane is that of

GAAR, SCOTT & Co.,

RICHMOND, IND.

Who will use **FIVE** of Them.

WHY DID THEY SELECT THIS CRANE?

They went up to **FRASER & CHALMERS, CHICAGO,** and saw the Crane at work in the foundry there and that settled it.

Everybody who sees this Crane at work, falls in love with it.

WHY?

Because it does the work quick. Lifts a load while other cranes are getting ready to do it. Lifts 10 tons as quickly as 10 pounds. Never gets out of order. No shocks. No jars. Requires no special operator. Every man in foundry works it. No matter how dumb or careless, can't hurt himself, work, or machine. All molders like it. Has a perfect motion. Foundries using it say it saves its cost in a year in good draws. Swings very easy. A 5-ton crane with a 3-ton load on it is in about the same condition as other cranes with out any load on them. Crane is attached to ordinary steam supply at the trifling cost of a little pipe. Uses so little steam it is never missed. In fact, in a small card we can't give one-half of its excellencies. You must write us.

In moulding Car Wheels these Cranes save their cost in a year.

Are Being Adopted by the Best New Car Wheel Works.

We Build Elevators on Same Steam Hydraulic Plan for Taking Stock Cheaply and Quickly to Cupola Platforms.

COMPRESSED AIR HOISTS.

We are the original patentees and builders of Pneumatic hoists and have made hundreds of them. We do not use our patents to exact royalties, but to protect us in the manufacture. With special facilities we build them cheaply. You will save money and litigation by buying air hoists from us.

Don't contract for Cranes, Elevators or Hoists before writing us for circulars and prices. Give steam, air or water pressure radius, height to square of building and capacity desired and we will name satisfactory prices.

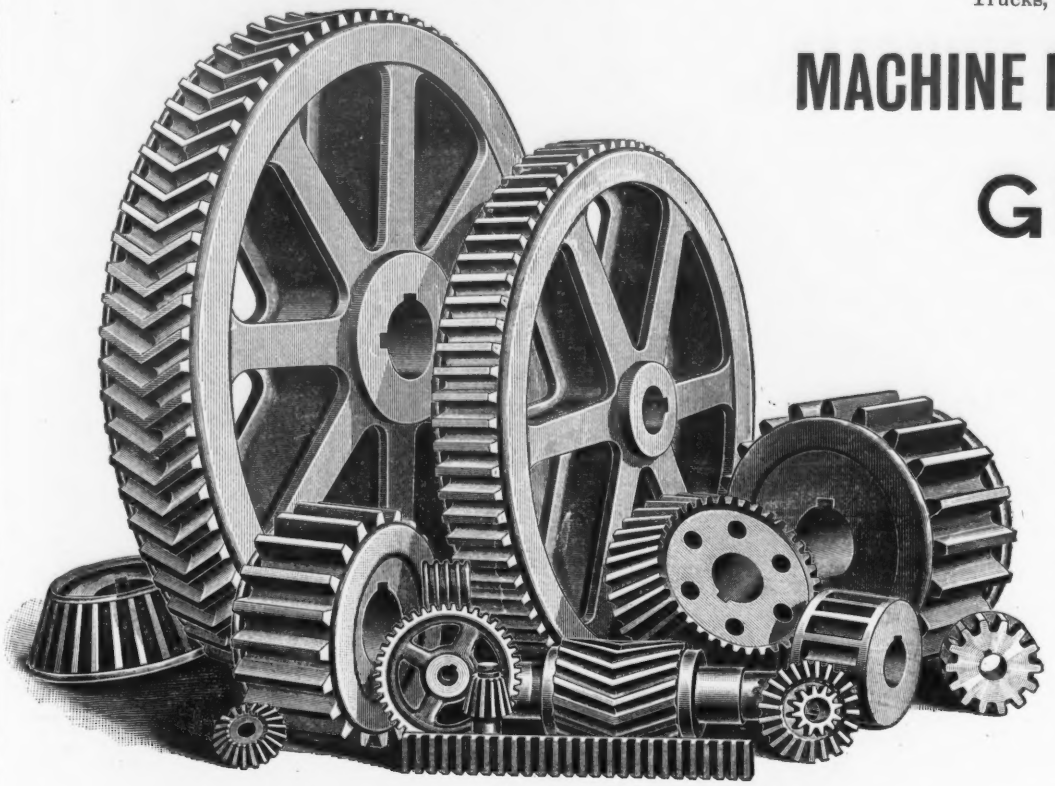
CRAIG RIDGWAY & SON,

COATESVILLE, PENN.

THE WALKER MFG. Co

ENGINEERS, FOUNDERS and MACHINISTS,

CLEVELAND, OHIO, U. S. A.



FOUNDRIES
COMPLETELY EQUIPPED.

Cranes, Cupolas, Ladles, Sand Sifters, Core Oven Trucks, Rumbling Mills, Hydraulic Elevators, Blowing Engines, Etc.

MACHINE MOLDED PULLEYS
AND
GEARS
A Specialty.

• • • •

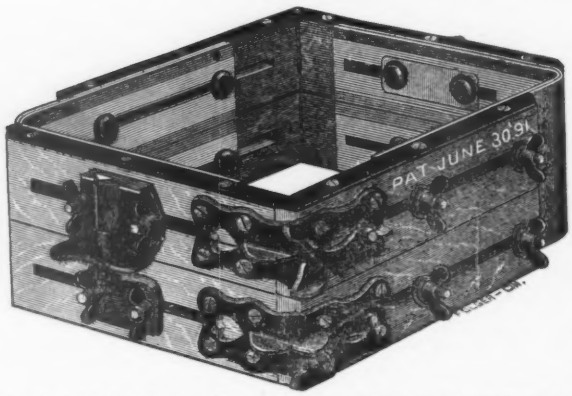
IN Accuracy of Pitch, Definition of Form, and Smoothness of Surface, Gears produced by our Patented Machinery are beyond compare. Moreover, extensive experience and scientific experiment, enables us to make our castings of a grade of iron perfectly adapted for strong, durable, Gears. During the last ten years thousands of our Gears have been sent to all parts of the United States, and have given universal satisfaction.

CORRESPONDENCE SOLICITED.

The Adjustable Snap Flask Co.,

LIBERTY, UNION CO. IND.

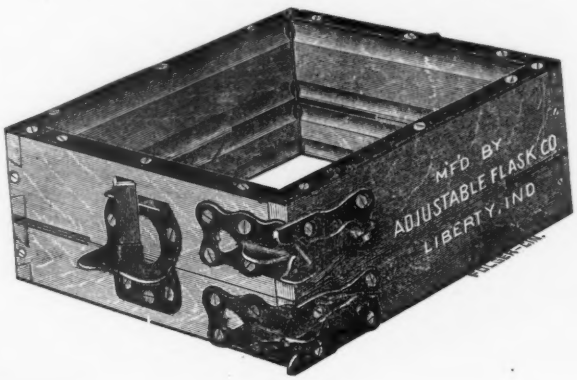
The Combination Adjustable Snap Flask.

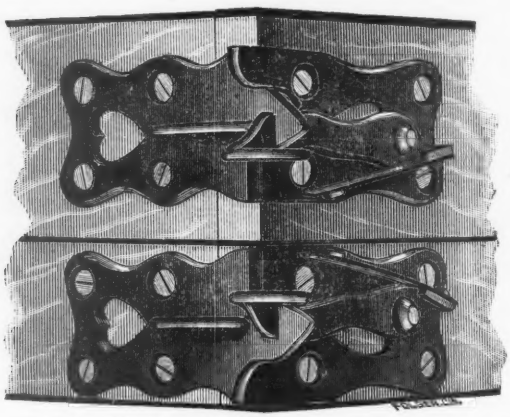


We present to you in the accompanying illustration, our new Adjustable Combination wood and metal snap flask, that can be adjusted to a variety of sizes from 9x10½ to 14x15 inches or any size between, to suit patterns used. The wood parts of the flask are the pieces to which the hinge is attached and also the parts to which the lash is fastened. The steel pieces are the inside lining of flasks. The wood and steel pieces are fastened together with bolts, and by means of a long slot we are enabled to spread the flask to any desired size. The wood parts are of ¾ in. cherry and the steel of 1-S steel. It has a spring latch which makes it very easy to open and close. It is made so substantial that it will not shift or get out of order while in use. In matching drag with cope, it makes a perfect adjustment of pins that do not shift, which supplies a long felt want in snap flasks. It will suit the molder because he uses only one flask in many sizes. It will save money for the manufacturer, as one size of our flask will answer the same purpose as several different sizes of the old style. The inventor is a practical molder and in constructing this flask has not destroyed the good features of any others, but has added many new ones. A three part flask is made to adjust the same as a two part.

TAPER WOOD FLASK.

Our new solid taper wood snap flask is made for foundries who run one size flask for a long time. The taper is made on a scale of one-quarter inch to one foot in height, allowing slip boxes to be placed over without crushing mold and still fit very tight. The flask is grooved on inside, which prevents sand from dropping out while closing. It is made of best material and workmanship. It has our new hinge and automatic spring latch.





AUTOMATIC LATCH.

Our new Automatic Latch is made of malleable iron and flat steel oil tempered spring. There is no coil spring to get out of order; When flask is closed the latch makes a solid locked corner. The latch is put on cope and drag in such manner that by pulling latches together with finger and thumb of one hand, the flask opens freely.

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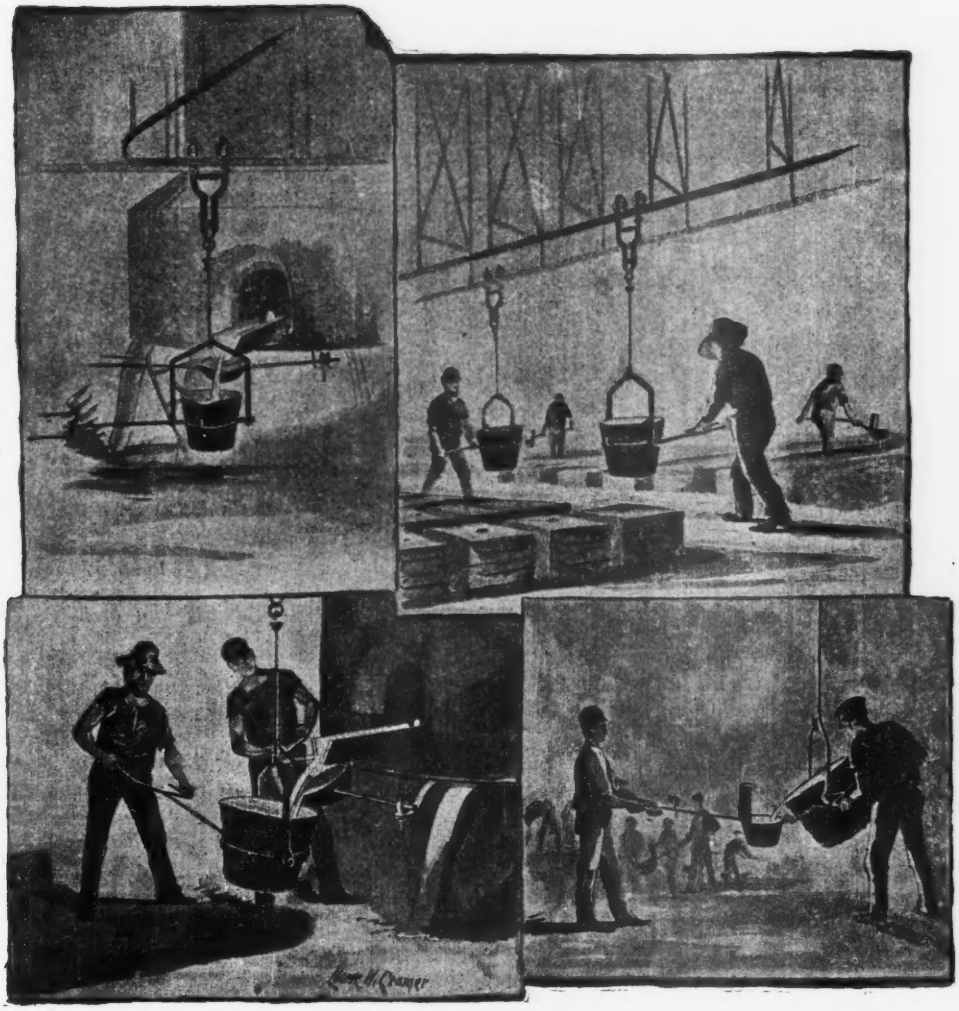

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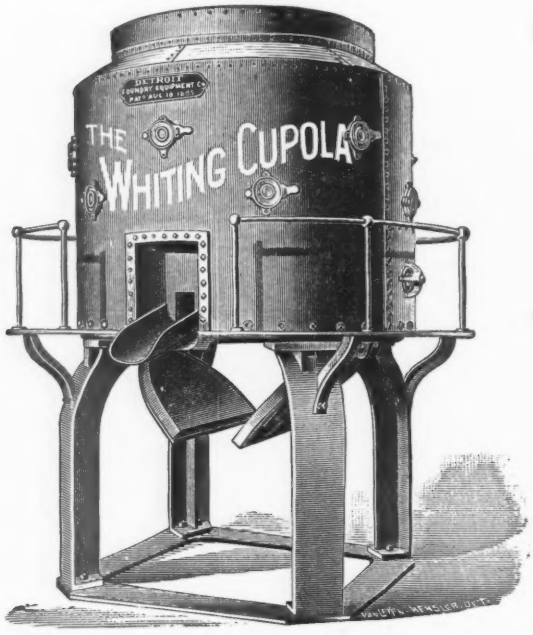

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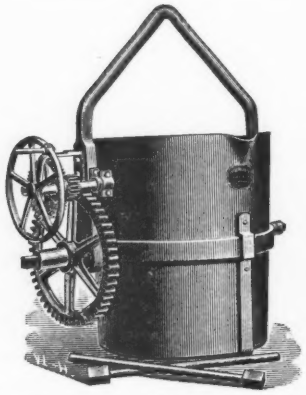

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"KEEP'S TEST" FOR CAST IRON.

BY W. J. KEEP, DETROIT, MICH.

Second Paper.

STRENGTH.

IN searching for a short name that shall indicate a stress applied transversely at the center of a test bar and gradually increased until the bar is fractured, and also to distinguish between this and a fracture caused by blows, at the center of the bar, each greater than the preceding, it has been difficult to find or invent a short word that will describe this and only this stress. We have decided to use the expression "dead load" for this application of stress. In previous papers we have used the word "weight" to represent this stress and in consulting such papers, this change in terms should be kept in mind.

KEEP'S DEAD LOAD TESTING MACHINE.

Fig. 16 is a single lever machine, in which, by moving a weight out on a beam l a gradually increasing stress is applied to the center i, of the test bar, which is held in flexible bearings k k exactly one foot apart. The beam

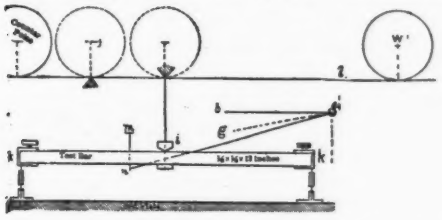

Figure 16.

is not kept floating as in many machines, but as the stress increases it goes down with the center of the test bar. An autographic record is made of the behavior of the bar for every instant during the test. The center i of test bar is connected with an arm a n. The short end of this arm is attached to an adjustable flexible bearing m n and the forward end a carries a pencil which bears on the diagram paper. The proportions of this are such that the motions of the center of the bar are magnified five times on the paper, and the record must be measured with a scale divided to 20ths of an inch and read as hundredths. The paper moves one quarter as fast as the weight. The stress is read in pounds avoirdupois on the beam and recorded on the diagram at the point of fracture. Do not trust to measuring the stress from the diagram. The machine is practically frictionless, and the diagram is a correct representation of the stress and strain. Fig. 17 represents a diagram made by this machine. The base line a b is made by moving the paper horizontally while no

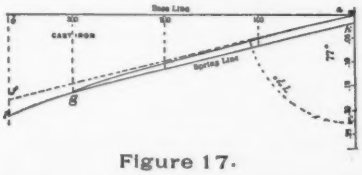

Figure 17.

stress is applied. If stress were applied and the paper was not moved, the line a c would be described. If the test bar is a perfect spring, that is if it is perfectly elastic and the stress is increased and the paper moved at a corresponding uniform rate, a straight diagonal a f will be described. The

distance from the base line *a b* to this spring line *a f* at any point is the deflection at that point. If the bar is of gray cast iron or of any metal not perfectly elastic, it will bend faster than a perfect spring and will take a set for each increase of stress, and the diagram will be the line *a g*. The distance between the spring line *a f* at any point and the line *a g* will be permanent set at that point. The distance from the base line to any point on the line *a g* will be the deflection and will be made up of elasticity measured above *a f* and set measure below *a f*. It is necessary at this point to give definitions of the terms which follow in italics. These were proposed in the paper "Aluminum and other metals compared" and were there treated more thoroughly than they can be treated here. The first definition separates elasticity from the stress exerted to produce a change of shape, and from the work that a distorted body can perform while recovering its former shape. These definitions are proposed to meet the conditions as brought out by the use of "Keep's Test." *Elasticity* is the property possessed by matter of regaining its original volume or shape after it has been distorted. Matter is *perfectly elastic* if it entirely regains its original volume or shape and is *imperfectly elastic* if its recovery is only partial. *The diagram records total deflection,* which is made up of *elastic deflection* above, and *set of deflection* below the line *a f*. *Rigidity or stiffness* is the ability of a material to withstand stress and retain its original form. It is *perfect* when any stress which can be applied will not cause the material to change form. The record or diagram of perfect rigidity would be the base line *a b*. *No rigidity* would cause the form of a material to change without limit on the least application of stress, and the record would be the line *a c* perpendicular to *a b* at the zero point *a*. With any ordinary material the diagram of rigidity would be a line *a f* starting at the zero point and lying between the lines *a b* and *a c*. The angle that this line *a f* makes with *a c*, when all scales of the diagram are exactly the same as those here employed, indicates the *relative rigidity*. This angle is measured with a transparent protractor, the center being placed on the zero point, the base line *a b* passing through the 90° mark and the graduated arc described with a $2\frac{1}{8}$ inch radius. The no rigidity line *a c* is the base of the protractor and we read the angle through which the spring line passes as the *rigidity angle*. The reason we must use a protractor of this exact size is because nearly all spring lines are curved and we must select some one point on the curve. When the test bar begins to take set, the diagram leaves the rigidity line, and the point where the lines separate marks the *limit of proportionality* and indicates the stress at which proportionality ceases.

We will now resume the description of the machine. Fig 18. is a prospective view. When the weight is at zero the counterpoise balances the beam. The weight and the diagram paper are propelled forward or backward by steel cords attached to the drum and crank at the rear of the machine. The traveling weight is 100 lbs., and the machine can exert a stress of 1,200 lbs. The arc at the forward end of the machine catches the beam when the test bar breaks.

TO TEST A BAR.

Run the weight to the left past the zero point, loosen the holder from the arc and raise the beam to the upper notch of the arc. Place the No. 1 square test bar in the supports and tighten the end set-screws. Always place the bar so that its number shall be at the right hand and on the side towards you. This brings the gate marks down and on the edge away from you. With a wedge provided for the purpose, clamp the pencil arm to the center of the test bar. Slide a strip of paper into the paper holder, run the weight forward to the zero point, with the right hand raise the forward end of the beam out of the notch in the arc and lower it until the pressure post bears on the bar. No stress is exerted on the test bar, and the pencil is therefore at its highest point. With the right hand move the paper holder back and forth to draw a base line. Now attach the

tightener to one of the pins of the paper holder, which push back slightly to take up any slack in the cord. With a pencil

Keep's Dead Load Testing Machine.

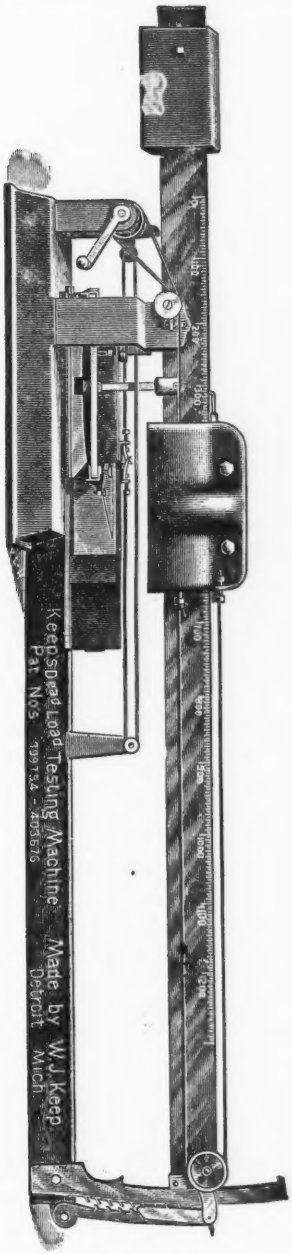

Figure 18.

make a mark over the point of the pencil *a* to represent the zero or starting point. See that the beam is free from the arc and then run the weight out to the 300 lb. mark.

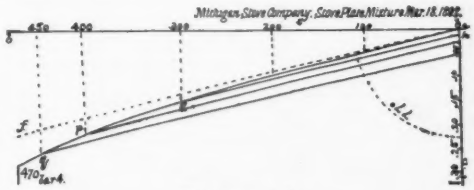

Figure 19.

(Fig. 19 is a diagram from an exceptionally strong bar of the Michigan Stove Co.'s stove plate mixture.) When the stress reaches 300 pounds, step to the forward end of the beam, loosen the holder from the arc and raise the beam to the upper notch of the arc and close the holder. Return to the crank, with the right hand pull the pencil from the paper and with the left run the weight back to zero. With the right hand lift the beam out of its notch and let it down until the pressure post rests on the test bar. Press the paper holder back to take up the slack of the cord and to bring the pencil under the zero of the diagram. The pencil will rest at *h* and *a h* ÷ 5 equals the set of the test bar for 300 lbs.

Run the weight forward again to the 300 lb. mark, and a new diagram *h g* is drawn. The first and last diagram meet at *g*. We may release and apply the stress from 0 to 300 as many times as we choose, and we find that the pencil always follows the line *h g*. Thus, although the test bar took set for every pound that the stress was increased up to 300 pounds during the first application, the bar has become a perfect spring and its nature has changed for all stresses less than 300. But the instant the stress exceeds 300 pounds the original character of the bar re-appears, and the the diagram beyond 300 is a continuation of the original diagram and upper line or diagram, taken as a whole, is exactly the same as it would have been if the stress had been continuously increased and had not been relieved at 300 pounds. After passing the 300 pound mark, run carefully, watching the divisions on the beam so as to catch the reading at the breaking point. If the stress reaches 400 it is well to repeat the

spring line. It is not often that we can catch a spring line for 450. All spring lines from the same bar are parallel. The spring line from a tempered steel bar will be a straight line, but the spring lines from cast iron and similar metals which take set are slightly curved lines. When the first bar breaks take the paper out and record the breaking weight at the end of the diagram; also record the number of the bar, the date of cast and any other condition attending the test, or what is better, put the diagrams on the same paper on which the size and shrinkage has been recorded. (See fig. 20.) When this record has been made, raise the pencil from the paper, and run the weight to the extreme left, and step forward and raise the beam to the top. Raise the pencil to the highest point, loosen the wedge and end binding screws and take out the broken pieces of the bar. With the hand break the No. 1 thin bar and put the ends containing the number of both the square and thin bar, in a paper or pigeon hole marked with the number and date of the test. Break the remaining bars in the same way. It is well to make two or three diagrams on one side of the paper and the rest on the other side and if the rest of the record is on the same paper it is in a convenient form for preservation. In a foundry running on a uniform grade of work, a test once a week is often enough, in which case the year's tests would be represented by fifty-two strips glued together at one end.

Fig. 20 represents the two sides of one of these record sheets greatly reduced in size, the actual length being 14 inches. Referring again to the diagram, fig. 19, a template may be made of the longest spring line, and it may be prolonged if necessary. This template can be placed parallel to the spring line, and with its zero point tangent to the first diagram at its zero point, a new spring line, *a f*, can be drawn. This divides all deflections into elastic deflection and set deflection, and the perpendicular distances between *a f* and *a q* are permanent sets. The rigidity angle may be taken from this spring line *a f*. Note again that all results are ***relative*** and never reduce results to so much per square inch cross section, for the reason that practice shows that the internal structure of a bar has so much more to do with strength than the slight variation in size, that a comparison of the sizes of the bars with strength does not show that this small variation exerts any influence on the results. †

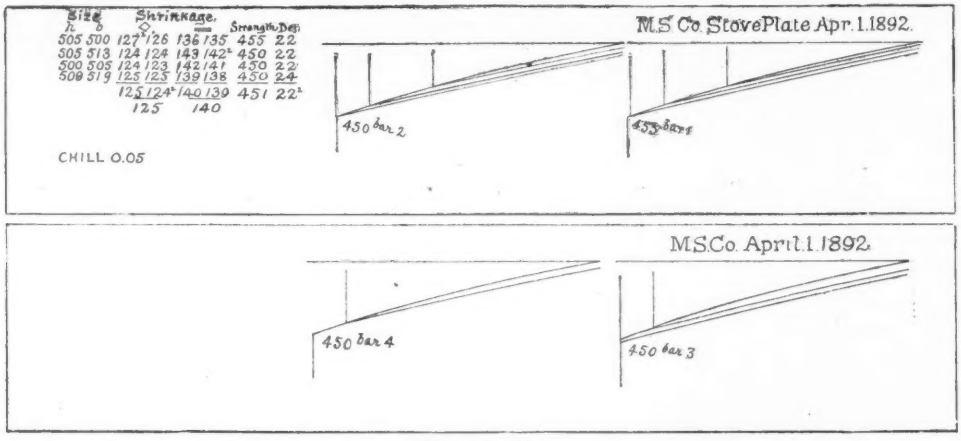

Figure 20.

We always record the actual strength of each of our standard bars. If an iron has a strength of 451 pounds "Keep's Test," it means that 451 is the average of

† The formula, that the strength varies directly as the square of the height of the test bar, directly as the breadth and inversely as the length, may be correct for bars where the structure is the same in each, but from the fact that the grain varies with the size of a cast iron test bar the formula cannot give correct results in calculating the strength of a large bar from the ascertained strength of a small bar or *vice versa*, we may, however, approximate the strength of a bar one inch square and one foot long by multiplying our result by eight; if one inch square and two feet long multiply by four; or the strength of a bar two inches high, one inch wide and two feet long, by multiplying our results by 16.

at least four bars broken by the dead load machine. The difficulty with making comparison with records of other machines, is that they apply stress by means of a screw at the center of the bar and then weigh the stress they have applied. This is not a gradual increase and the bar often breaks during the application of stress and before the amount of stress is ascertained. In "Keep's Test," the bearings are always one foot apart and the greatest accuracy is attained. Large discrepancies in strength of bars may result from a blow hole or cold shut in the fracture or from a corner of a bar not having run full, in which case it is not necessary to include the result in making up the average. Generally, however, a study of the fracture under a lens will not reveal any reason for the low strength. The greatest strength for a single bar yet recorded in our stove plate castings is 470. The largest average for a set of four bars was 451 pounds. A bar from the ordinary mixture of Henry R. Worthington, used for hydraulic machinery broke at 475 pounds. William Deering & Co. report a test bar breaking at 488 pounds "Keep's Test." Above 300 pounds is more than the average of ordinary castings. No oil should be used on these testing machines as the dust from the bars will thicken the oil. If any part runs stiff, clean out the dust. It may sometimes be best to use a little flour of emery to make a part work smoothly or apply plumbago.

CHILL.

The surfaces of the yokes that form the ends of the mold chill the ends of the test bars. The yokes do not effect the test bars except at their ends. By breaking the end of a test bar lengthwise the depth of the chill can be measured. Lay the end of one of the

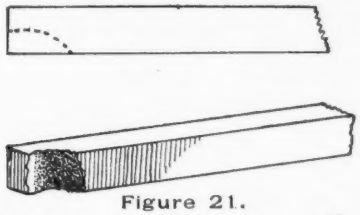

Figure 21.

broken square bars upon an anvil, place the point of a cold chisel (fig. 21) a little behind the chilled portion and a blow from a hammer will split off a side of the bar. By the eye decide where the chill fairly stops and measure its distance from the end in hundredths of an inch and record this as the chill of the iron. Iron for thin castings, like stove plate or light hardware, will have from one-sixteenth to three-sixteenths of an inch chill. In machinery castings containing less silicon the chill will run up to half an inch at times. Nos. 1 and 2 pig iron often give bars with no chill.

GRAIN.

The character of the fracture is recorded as seen through a double convex lens, the two having together a focal distance of three-quarters of an inch, the

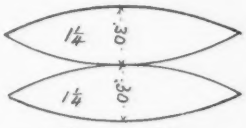

Figure 22.

diameter of the lens being 1¼ inches (Fig. 22). We have obtained better results from this combination than from any other lens.

What has now been described is the ordinary foundry test. It may seem too precise, but having started quite a number in the use of this test we know how hard it is for a beginner to realize what serious errors creep in by making slight changes; also that the ordinary foundryman is not used to accurate methods.

We would advise that each one should become accustomed to what we have described before they attempt anything farther. Nothing more is needed for ordinary every day practice. For testing mixtures of iron that are supposed to run regular, select one day each week, and have four pairs of bars poured from the center of the heat, ground, measured for size, shrinkage and chill, determine strength, and record all on one sheet of diagram paper, together with the mixture of the iron, (unless a book is kept for a record of mixtures.) Make a test the day before a change is made in the mixture. This with the hints given in the paper on "Silicon in Foundry Mixtures" will enable a foun-

dryman to do almost anything he wishes with his iron.

FLUIDITY.

Iron may be very thinly liquid and may freeze quickly, or it may not be so fluid, but by remaining liquid longer will fill the mold better than the former. It is a very difficult thing to measure fluidity, and it is a question whether we can measure it. So far as we are aware the method here described is as satisfactory as any. Use a pattern one foot long, one inch wide and $\frac{1}{8}$ inches thick and run it from the end, (see the thin bar in Fig. 23). It is a rare thing for

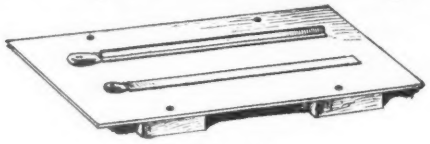

Figure 23.

the bar to run its whole length. The length of the casting in inches is the measure of fluidity and is, no doubt, a true measure for that particular cast, but the results are unsatisfactory if we try to find which of several mixtures of iron are the most fluid, as the heat of each, at the time of pouring will vary. In the study of grain and chill this strip may be of considerable value, it being so thin that by breaking it the tendency to chill will be very apparent. The length that the fluid strip is gray, where chill begins, and where it becomes all white, is sometimes recorded.

CROOK.

Along with the fluid strip, but poured by a separated gate, is another strip of the same dimensions as the fluid strip but with a rib on one side. (See fig. 23.) The distance that the rib has pulled the ends of the bar away from a straight line is the crook. To measure it an appliance is added to the measuring table. In the study of grain this strip brings out many peculiarities. In making these strips the greatest care must be taken to have the castings exactly like the pattern. The use of either of these tests is not recommended.

THE MEASURE OF STRENGTH BY IMPACT.

The effect of a dead load increased gradually until fracture takes place has already been described. Metals are often used in places where they must resist shock. The effect of a blow cannot be ascertained from the results of a test with a dead load. An iron may be able to sustain a great dead load and yet break under a comparatively light blow and *vice versa*. If you wish to know its resistance to impact, you must use a machine especially constructed for the purpose. Blows from a sledge repeated on a casting cannot be delivered at the same spot or with equal force and in any case the break occurs on account of injury to the grain. The ordinary method of testing car wheels by letting fall a weight in a sort of pile driver on the hub may not injure the grain, and if so is a satisfactory test for wheels.

KEEP'S IMPACT TESTING MACHINE.

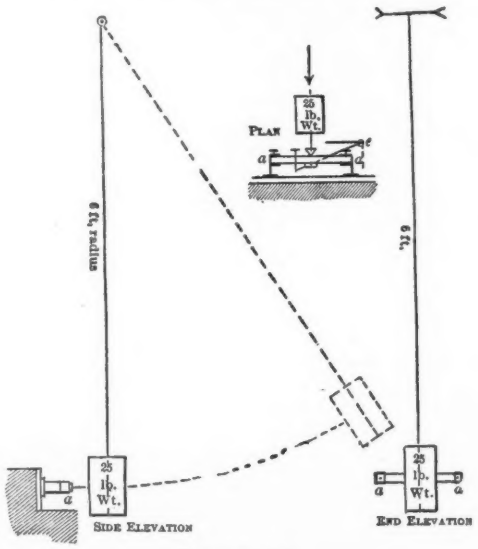

Figure 24.

For testing the standard half-inch square bars by impact, where we cannot know how much of a blow the bar will bear, the center of the bar is protected so that the grain cannot be injured and then blows are delivered with a 25-pound hammer, beginning with a fall of one-eighth of an inch, and one-eighth of an inch fall is added to each subsequent blow until fracture takes place. No change in grain due to crystalization can take place during the delivery of such a small number of blows, and reasoning

from our experience with the dead load machine, probably each blow, short of the one that breaks, makes the bar a perfect spring for all blows less than that one, though this is not exactly true, for the reason that the blows being so sudden, and the rebound being equally sudden, the grain does not have time to adjust itself to the deflection. The deflection is, therefore, generally greater for the same bars when broken by impact than when broken by dead load.

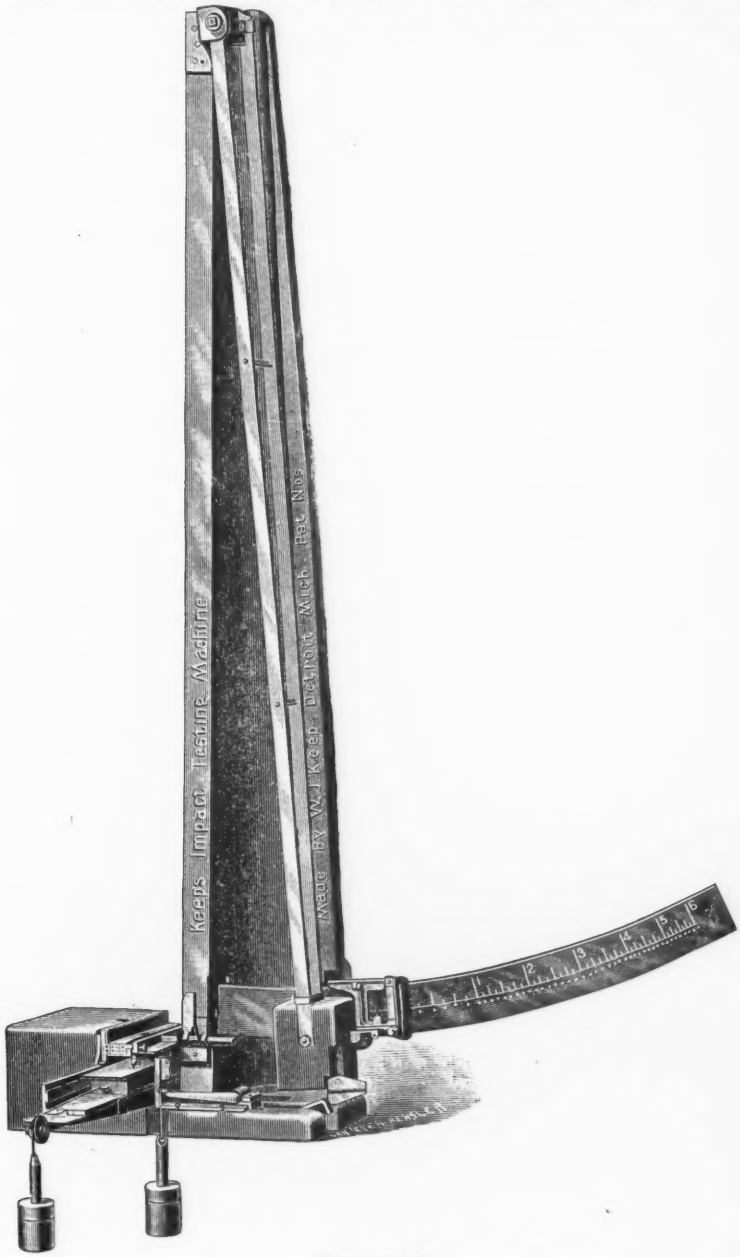

Figure 25.

To insure accuracy the 25-pound hammer swings on a six-foot radius. Fig.

24 shows three outline views of this machine, while Fig. 25 is a perspective view.

The bedplate is not heavy enough to resist all blows, and it is better to set the forward end against a brick wall. The test bar is clamped in the same recording device as was used in the dead load machine and the same pencil and paper are used. To the paper holder is attached a cord passing over a sheave and a weight at the end tends to pull the paper holder along. On the rebound of the hammer a shuttle releases one of the pins on the paper holder and allows it to move $\frac{3}{16}$ of an inch to carry the record of the previous blow out of the way and to bring a clear place under the pencil to receive the next record. Fig. 26 is a diagram made by this machine and records deflection, set and vibration of the bar at each blow. A base line must be drawn, but is as well or better to draw it after the diagram is complete, as it will always be parallel with the edge of the paper. The routine in making a test with this machine is very important.

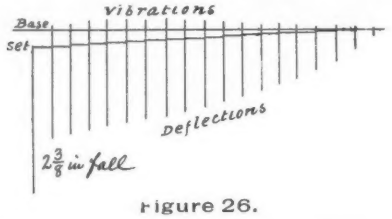

Figure 26.

See that the shuttle is in place to release the pins on the paper holder. See that there is a weight on both paper holder and shuttle to hurry their action. See that the pencil is sharp, with a very strong point and that it is gripped tightly. The test bar lies with its number up and on the end nearest you. See that the cage is wedged securely to the bar and that the end set screws are tight. The hammer should lie against the receiver. Set the catch at the hole of the one-eighth-inch fall. Draw back the hammer with the left hand and catch it on the trigger. This backward movement has worked the shuttle and has moved the paper, thereby making the commencement of the base line. With the right hand press the trigger and release the hammer. As it swings forward and strikes a blow, with the right hand move the catch forward on the arc one hole, and with the left hand catch the hammer on its rebound and bring it up to the trigger. Repeat these blows increasing each by one-eighth of an inch fall; that is, move the trigger back one hole each time until the one-inch-fall has been reached, at which time you must tighten the cage and set screws. Make this examination after the stroke for even inches is reached or oftener. Continue in this way until the bar breaks.

Read from the arc the height of the fall which broke the bar and mark it on the diagram. A base line can now be drawn from the beginning already made and parallel to the edge of the paper. From this base line deflection, set and vibration can be measured. When both machines are used, six bars should be made to give an average of three for each machine.

(To be Continued.)

CASTINGS.

How to obtain their Measurement and Reckon their Weights, also the Nature and Qualities of the Materials used in producing them. Percentage in the Foundry. Important Facts. Formulas. Tables, etc.

BY S. BOLLAND.

Written expressly for THE FOUNDRY. (Copyrighted.)
(Continued from January.)

The weight of *cast iron balls* may be determined by multiplying the cube of the ball's diameter by .137, as follows:

```
                    12
                    12
                   ---
                   144
                    12
                   ---
Cube.....1728
Multiplier, cast iron only..... .137
                  ------
                 12096
                 5184
               1728
               ------
Weight.....236.736  Ans.
```

Or very nearly as before.

PERCENTAGE IN THE FOUNDRY.

Without some knowledge of the rules of percentage it is hardly possible for

any founder to mix cast iron with the view of obtaining a certain amount of any or all of the elements therein contained.

Supposing we wish to ascertain how much silicon enters into any mixture, we must by chemical analysis, find out just how much of that element is contained in each of the brands of iron that constitute the mixture, and according to the percentage found in the brands used so will the total percentage of silicon be.

That this may be made as easy of accomplishment as possible, I have chosen for the purpose of illustration a few of the rules in percentage, which bear directly upon this and kindred subjects.

Let us suppose that in a charge of 600 pounds we have four different kinds of iron, as follows:

Sloss	3000,	contains by chemical analysis		3.35%	Silicon
Scrap	2000,	"	"	1.5	"
Macungie	750,	"	"	1.82	"
Crozier	250,	"	"	1.14	"
Total...	6000				

Required the total percentage of silicon contained the whole charge.

I put it this way so that some of the questions may be used as examples and serve the double purpose of explaining the rules and solving the problem before us.

Percentage is a method of computing by means of a fraction whose denominator is 100.

The term per cent. is an abbreviation of the Latin *per-centum*, which signifies by the hundred.

The *rate* per cent. is the number of hundredths. Thus, 8 per cent. is eight hundredths, and may be expressed $\frac{8}{100}$, or .08, or 8%.

Per cent. is simply the proportion of a hundred and is not any of the denominations of Federal money; 10 per cent. is not 10 cents, nor 10 dollars, but $\frac{10}{100}$; 10 per cent. of $50.=$5; 10 per cent. of 85 tons is $8\frac{1}{2}$ tons.

Case 1.—To find the percentage of any number or quantity, the rate per cent. being given.

Rule.—Multiply the given number by the rate per cent. and divide by 100, viz., point off two decimals.

Examples.—(1.) What is 8% of 640 pounds?

Operation. — $640\times 8 = 5120 \div 100 = 51.20$ lbs. 8% of $640 = \frac{8}{100}$ of $640 = \frac{5120}{100} = 51.20$. Answer.

(2.) What is 50% of 3.35.

```
   3.3 5
     50
1 0 0)1 6 7.5 0 0(1.6 7 5 Ans.
      1 0 0
      -----
        6 7 5
        6 0 0
        -----
          7 5 0
          7 0 0
          -----
            5 0 0
            5 0 0
```

(3.) What is $33\frac{1}{3}\%$ of 1.5.

```
      1.5
      3 3⅓
      ----
        5
        4 5
        4 5
1 0 0)5 0.0(.5
      5 0 0
```

(4.) What is $12\frac{1}{2}\%$ of 1.82.

```
    1.8 2
      1 2½
      ----
      9 1
    2 1 8 4
100)2 2.7 5 0 0(.2275 ans.
    2 0 0
    -----
      2 7 5
      2 0 0
      -----
        7 5 0
        7 0 0
        -----
          5 0 0
          5 0 0
          -----
```

(5.) What is $4\frac{1}{8}\%$ of 1.14.

```
    1.1 4
      4⅛
      ----
      1 9
    4 5 6
100)4.7 5 0 0(.475
    4 0 0
    -----
      7 5 0
      7 0 0
      -----
        5 0 0
        5 0 0
        -----
```

Case 2.—To find what rate per cent. one number is of another.

Rule.—Annex two ciphers to the percentage, and divide by the number on which the percentage is reckoned.

Example.—(6.) What per cent. of 40 tons is 8 tons.

$800 \div 40 = 20$. $8 = \frac{8}{40}$ of 40; $\frac{8}{40}$ of $100 = 20$

(7.) What per cent. of 6000 lbs. is 3000 lbs. (Sloss.)

```
6 0 0 0)3 0 0 0.0 0(.5 0. Answer.
        3 0 0 0 0
        ---------
          0 0 0 0 0
```

(8.) What per cent. of 6000 lbs. is 2000 lbs? (Scrap.)

6000)2000.00(.33⅓. Answer.
18000
20000
18000
2000

(9.) What per cent. of 6000 lbs. is 750 lbs.? (Macungie.)

6000)750.00(.12⅜=12½% ans.
6000
15000
12000
3000

(10.) What per cent. of 6000 lbs. is 250 lbs.? (Crozier.)

6000)250.00(.04⅙— Answer.
24000
1000

Case 3.—To find a number when the value of a certain per cent. is known.

Rule.—Annex two ciphers to the percentage and divide by the rate per cent.

Example.—(11.) 42 is 25 per cent. of how many pounds of iron?

25)4200(168 lbs. Answer, or,
25
170
150
200
200

4200÷25=168. Ans.

Case 4.—To find what number is a certain per cent. *more* or *less* than a given number.

Rule.—When the given number is *more* than required number, annex two ciphers to the given number and divide by 100, *plus* the rate per cent.

When the given number is less than the required number, annex two ciphers to the given number and divide by 100 *less* the rate per cent.

(12.) What amount of gold at a premium of 25 per cent. can I buy for $720.—in currency.

100+25=125)72000(576. Ans. $576
625
950
875
750
750

(13.) Purchased pig iron and sold it for $1680, thereby losing 20 per cent. What did the pig iron cost?

100−20=80)168000(2100. Ans., $2100.
160
80
80

A careful examination of these rules and examples will show that by their aid we have solved the problem asked at the outset, for, as shown in Case 2, Examples 7, 8, 9 and 10, 50 per cent. of the charge is sloss; 33⅓ per cent., scrap; 12¼ per cent., macungie, and 4⅛ per cent., crozier.

Now, sloss contains 3.35 per cent. of silicon, and as we are using .50 per cent. of this iron in the charge, we must know what that percentage amounts to. By referring to Case 1, we find the rule for ascertaining this: 50 per cent. of 3.35 is seen to be 1.675% as per example 2, case 1.

Scrap contains 1.5 per cent. silicon, 33⅓ per cent. of which is .5 per cent., as per example 3, case 1.

Macungie contains 1.82 per cent. silicon, 12¼ per cent. of which is .2275% as per example 4, case 1.

Crozier contains 1.14 per cent. silicon, 4⅛ per cent. of which is .0475%, as per example 5, case 1.

These items collected in the form of a convenient table shows that the whole mixture contains 2.45%, or nearly 2½ per cent. of silicon, as follows:

CHARGE OF 6000 POUNDS.

Sloss	3000 = 50%	of charge,	contains	3.35%	of silicon,	50%	of which	is	1.6750
Scrap	2000 = 33⅓%	"	"	1.50%	"	33⅓%	"	"	.5
Macungie	750 = 12½%	"	"	1.82%	"	12½%	"	"	.2275
Crozier	250 = 4⅙%	"	"	1.14%	"	4⅙%	"	"	.0475
	6000 1.00								2.4500

SUBSTANCES.	Weight of a Cubic inch in Pounds.	Weight of a Cubic foot in Pounds.	Weight of one foot square, one inch thick.	Weight of bar one inch square, one foot long.	Weight of bar one inch Diameter, one foot long.	Melting Points of Solids in Degrees.	Tensile strength or weight required to pull a bar one inch square asunder.	Transverse strength of bar 1 in. sq. and 1 ft. in l'gth Weight susp. on one end	Crushing strength or wgt. required to crush a bar one inch square.	Torsion.	Relative Strength to resist Torsion, Lead being 1.	Resilience or Toughness.	Specific Gravity.
METALS.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Deg.	Lbs.	Lbs.	Lbs.				
IRON CAST, Pig	.260	440	....	....	....	.....	20.000	500	100.000	400		15	7.200
IRON CAST, Tough	.263	450	37.5	3.12	2.45	3.477	25.000	600	120.000	500	9.	25	7.207
IRON CAST, Gun Iron	.264	455	....	....	....	.....	30.000	700	125.000	700	....	50	7.308
IRON, Wrought	.281	486	40.5	3.33	2.61	3.981	60.000	900	50.000	750	10.1	20.000	7.788
STEEL	.283	490	40.8	3.40	2.67	2.501	90 000	1.500	125.000	1.200	16.6	15.000	7.833
GOLD, Cast	.696	1210	....	....	....	2.587	20.000	.....	35.000		....	.....	19.258
SILVER, Cast	.378	654	54.6	....	....	1.250	40.000	500	.....		....	.....	10.474
COPPER, Cast	.317	540	47.5	3.81	2.99	2.550	20.000	.....	100.000	350	4.3	200	8.788
COPPER, Drawn	.321	555	....	....	....	.....	60.000	220	.....	750	....	40 340	8.880
TIN, Block	.263	455	38.	....	....	420	4.000	50	15.500	60	1.4	2.500	7.291
ZINC, Cast	.248	437	36.6	9.05	2.40	741	2.500	30	.....	30	....	500	6.861
ZINC, Rolled	.263	440	....	....	....	.....	15.000	200	164.800	200	....	.....	7.191
BRASS { 3 Cop. { Yellow / 1 Zinc. {	.282	525	43.6	3.63	2.85	1.897	28.000	.....	.....	.....	4.6	4.000	7.820
BRASS, Fine Drawn	.....	535	....	....	....	.....	80.000	.....	165.000	1.000	....	15.000	.....
LEAD, Cast	.410	710	59.3	4.94	3.48	617	1.800	20	7.000	20	1.	.....	11.352
LEAD, Rolled	.411	712	....	....	....	.....	25000	30	.....	30	....	....	11.388
AMUMINUM	.092	160	....	....	....	700	.....	.....	.....	.....	.....	.....	2.560
BRONZE { Copper 10 / Alum. 1	272	480	....	....	....	.....	70.000	.....	135.000	400	....	.....	7.680
BRONZE { Copper 10 / Tin 1	.309	535	42.5	3.54	2.78	.....	56.000	.....	.....	500	5.	8.000	8.560
MINERALS.													
BRICKS, Common	.....	132	....	....	....	.....	225	7	2.500	....	....	.....	2.112
GLASS	.....	155	....	....	....	.....	.....	.....	.....	.....	.....	....	2.487
GRANITE	.....	165	....	....	....	.....	1.000	25	10.000	980	....	.....	2.654
LIMESTONE	.....	165	....	....	....	.....	500	40	6.000	100	....	.....	2.654
SAND, Dry	.....	120	....	....	....	.....	.....	.....	.....	.....	....	.....	1.920
SAND, Moist	.....	128	....	....	....	.....	.....	.....	.....	.....	....	.....	2.050
COAL, Anthracite	.....	96	....	....	....	.....	.....	.....	.....	.....	....	.....	1.536
COAL, Bituminous	.....	80	....	....	....	.....	.....	.....	.....	.....	....	.....	1.280
COKE	.....	62.5	....	....	....	.....	.....	.....	.....	.....	....	.....	1.000
WOODS.													
LIGNUMVITA	.....	75	....	....	....	.....	12.000	160	10.000	150	....	.....	1.200
LANCEWOOD	.....	60	....	....	....	.....	23.000	150	.....	120	....	.....	960
BOX	.....	60	....	....	....	.....	18.000	130	10.000	125	....	.....	.960
CEDAR	.....	55	....	....	....	.....	11.500	100	6.000	100	....	.....	.880
OAK	.....	55	....	....	....	.....	17.000	150	10.000	140	....	.....	.880
BEECH	.....	50	....	....	....	.....	16.000	120	8.000	110	....	.....	.800
MAHOGANY	.....	50	....	....	....	.....	16.000	120	8.000	180	....	.....	.800
BIRCH	.....	50	....	....	....	.....	15.000	130	5.000	....	....	.....	.800
PINE, Pitch	.....	40	....	....	....	.....	10.000	100	8.000	65	....	.....	.640
PINE, White	.....	34	....	....	....	.....	.....	.....	.....	.....	....	.....	.554
WALNUT, Black	.....	40	....	....	....	.....	8.000	150	8.000	130	....	.....	.640
SPRUCE	.....	30	....	....	....	.....	17.000	120	6.000	....	....	.....	.480
AIR, Atmospheric	.....	.07529	....	....	....	.....	.....	.....	.....	.....	....	.....	.001205
WATER, Rain	.....	62.5	....	....	....	.....	.....	.....	.....	.....	....	.....	1.000

Explanation of the above table of weights, strength, melting points, specific gravity, etc., of metals, including the chief characteristics of useful minerals and woods.

A vast amount of useful information may be obtained from the above table if it be properly understood.

The first in the table contains a long list of metal, minerals and woods, which are in constant use, and as quite a large number of these are in great demand in the foundry, a knowledge of their several natures and qualities will always be servicable.

The second column gives the weight of a cubic inch of all the metal included in the list and serves as a multiplier when the contents of a casting have been reduced to cubic inches; for instance, a plate 12 inches square, 1 inch thick=144 cubic inches; if the weight is required in cast iron, find cast iron in the first column opposite to which the weight of a cubic inch is found to be .263; then, 144×.263=37.872, or over 37½ pounds. If such a casting were required in lead the weight of a cubic inch is stated .41; then 144×41=5904, or a little over 59 pounds. Aluminum being only .092 lbs. per cubic inch would show 144×.092.=132.48, or nearly 132½ pounds.

The third column shows the weight of a cubic foot in pounds and may be made very servicable at times. Suppose it were required to know the weight (in cast iron), of a piece 3 feet square and 4 feet high; then, 3×3=9, and 9×4=36, the number of cubic feet contained. By the table, a cubic foot of cast iron weighs 450 lbs.; then, 450×36=16200, or 200 lbs. over 8 tons.

A cubic foot of dry sand (as shown), weighs 120 lbs, therefore, the same bulk would only weigh 4320 lbs.; thus, 120×36=4320 lbs., or 320 lbs. over 2 tons.

The fourth column gives weight of a superficial square foot, 1 inch thick; fifth; the weight of a bar one inch square and one foot long, and the sixth being the weight of a bar 1 inch diameter, 1 foot in length, all of which is very useful data to have at hand when wanted.

MELTING POINTS.

This column gives the melting points of the simple metals mentioned, but the melting points of alloys are invariably below that of the simple metals composing them; for instance, 1 tin and 1 lead, melts at 370°; 2 tin and 1 lead, melts at 340°; 3 tin and 3 lead, and 1 bismuth at 310°; 1 tin, 1 lead and 1 bismuth, at 310°. A still lower melting point is obtained when 5 zinc, 3 lead, 3 bismuth and 3 mercury is used, the latter alloy being said to melt at 122°.

TENSILE STRENGTH.

The tensile strength of any material is the cohesive power, or resistance to separation by which it resists an attempt to pull it apart in the direction of its fibres or particles.

The table gives results of tests of the various substances under ordinary circumstances, but much higher rates have been obtained when special effort has been made with the view ascertaining the very best results possible. As stated in the table, the weights given are the number of pounds required to pull a bar one inch square asunder, or its equivalent. Instead of weights being used for this purpose, however, testing machines are constructed which determines the strength of materials with strains of different kinds; tensile, transverse, torsional, crushing, etc.

The bars made for this purpose are purposely made to a uniform measure of one inch square of sectional area and usually one foot in length. To ascertain the tensile strength of this bar it is gripped tight at each end and the strain applied until it breaks or tears asunder; an index indicates the amount of strain existing at the movement of rupture.

The ultimate extension of cast iron is about the 500th part of its length.

TRANSVERSE STRENGTH.

The breaking weights given in this table represent the number of pounds weight required to break a bar one inch square and one foot in length, the weight suspended on one end. This means that the weight or pressure is applied one foot distant from the point where the opposite end is held fast.

The relative stiffness of materials to

resist a transverse strain is as follows:

Wrought iron	1.3	Oak	.095	Elm	.073
Cast iron	1.	Ash	.089	Beech	.073
White pine	.1	Yellowpine	.087		

The following table shows how great a diversity of strength may be given to the same sectional area of cast iron by simply changing the form of the casting. It will be noticed that the lowest result is 565 and the highest 2652 pounds.

Note.—A careful study of this will yield good results.

Transverse strength of cast iron bars, reduced to the uniform measure of one inch square of sectional area, and one foot in length. Fixed at one end, weight suspended from the other.

FORM OF BAR.	BREAKING WEIGHT IN POUNDS.
Square, (see fig. 10)	873
Square, diagonal vertical, fig. 11	568
Column, solid, fig. 12	573
Hollow column, greater diameter, twice that of the lesser, fig. 13	794
Rectang'lr Rim, 2 in. deep x ½ in. thick	1456
" " 3 " x ⅜ " fig. 14	2392
" " 4 " x ¼ "	2652
Equlateral triangle, an edge up, fig. 15	560
" " an edge down, fig. 16.	958
Beam 2 in. deep x 2 in. wide x .268 thick, fig. 17	2068
" " " " " " " fig. 18	565

CRUSHING STRENGTH.

What is meant by crushing strength is the power inherent in the material to resist a compressive or pushing stress, which force would tend to shorten it.

While the effect of tensile stress is always to produce rupture or separation of particles in the direction of the line of strain, that of crushing or compressive stress may be to cause the material to fly into fragments, to separate into two or more wedged shaped pieces and fly apart, to bulge, buckle or bend, or perhaps, to flatten out and utterly resist rupture or separation of particles.

TORSIONAL STRENGTH.

Torsional strength means the ability of the material to resist a twisting or wrenching of its parts by the exertion of a lateral force tending to turn one end, or part of it, along a longitudinal axis, whilst the other is held fast or turned in an opposite direction.

The figures given in the column under "torsion," represent the relative stiffness of the several substances mentioned.

Hollow cylinders or shafts have greater torsional strength than solid ones containing the same volume of material.

Solid square shafts have about ⅛ less torsional strength than solid cylinders of equal area.

The torsional strength of cast steel is about double that of cast iron.

RESILENCE OR TOUGHNESS.

The term resilence is used to specify the amount of work done when the strain just reaches the corresponding elastic limit. The table shows the ultimate resilence of metals as tested in the Stevens Institute of Technology, Hoboken, N. J., and gives, at a glance, the comparative ability of metals to resist forces such as bending, etc.

The resilence of Phosphor Bronze is far in excess of the ordinary bronze.

SPECIFIC GRAVITY.

Specific gravity of any body is the proportion which the weight of a certain bulk of that body bears to the same bulk of another body, which is taken as standard.

The standard for substances, solid and liquid, is distilled water at the temperature of 62° Fah., a cubic foot of which weighs 1,000 ounces avoirdupios, or 62.5 pounds.

The specific gravity of solid bodies is best measured by the hydrostatic balance, which gives the weight of a volume of water equal in bulk to the solid, by which it is only necessary to divide the weight of the solid, in air, to obtain the specific gravity.

A cubic foot of water weighs 1,000 ounces. If the same bulk of another substance, as for instance, cast iron is found to weigh 7.200 ounces, its proportional weight or specific gravity is 7.2.

The weight of a cubic foot is obtained from the figures representing specific gravity or density, by moving the decimal point three figures from the right which gives the weight in ounces, and these again divided by 16 gives the

pounds avoirdupois in a cubic foot, thus 7200.÷16=450 pounds.

Gold is 19 and silver 10 times heavier than water, consequently the numbers 19.000 and 10.000 represent the specific gravity of gold and silver.

The heaviest known substance is Iridium, used for the pointing of gold pens, its specific gravity is 23.000. Carbonic acid, gas or choke damp is 300 times lighter than water, common air 800, street gas about 2.000, and pure hydrogen the lightest of all substances, 12.000 times.

CHICAGO MANUAL TRAINING SCHOOL.

THIS institution is located on West Monroe street, near Halstead and is part of the public school system of Chicago. It embraces the foundry, wood, machine and smith shops, and is free to all boys who have successfully passed the examination to the High School, and although, it has been in operation for the past two years, is but little known, even in Chicago, but if it keeps on growing at its present rate it will soon be necessary to have larger quarters.

The foundry, in which we are mostly interested, contains twenty-four benches, where seventy-two boys can work daily, in shifts of two hours. As in the other departments, everything is completed hand tools, flasks, etc., one cupola furnace, two brass furnaces and one core oven, in fact everything to complete a foundry. These young molders produce specimens in iron that would pass a good inspection anywhere. So far the heaviest work has been lathe legs, but they hope soon to test their skill in making a complete engine, and judging from appearances, we have no doubt of their success.

LARGE ADDITIONS TO AN ALREADY EXTENSIVE PLANT.

THE Joseph Dixon Crucible Company, of Jersey City, manufacturers of Dixon's "American Graphite" Pencils, are taking time by the forelock by putting a fifth story, 175 x 75 feet, on their pencil factory. During the past summer and fall they have been unable to promptly fill their orders for Dixon's pencils, even though working their already superior facilities to their full capacity. It was therefore decided to push forward the work at once instead of waiting until spring, as intended. The new addition will be equipped with new and improved pencil machinery of their own invention. As in the great pork packing establishments of the West, where piggy starts in as straight pork and comes out ham, shoulders, bacon, sparerib, tenderloins, sausage headcheese, pickled pigs' feet, bristle brushes, etc., so Florida cedar and American graphite will start in, and come out of Dixon's new machinery in "round" and "hexagon" shape, "regular size" or "tablet," "full length" or "pocket," for "office," "school," "carpenters'" or "artists'" use, in "satin," "maroon," "ebony," "cedar" or "natural" finish, in the thousand and one styles in which we now have our pencils served to us.

Besides this large addition to their pencil factory, the Company will establish a rubber and brass plant for the manufacture of the various pencil accessories aad novelties.

As it was only in 1891 when the Dixon Company put extensive additions on their Crucible and Black-lead works, and erected offices which for size and beauty are second to none in the State, it is very evident that prosperity claims the Dixon Company for its own, and that the Company is well officered and wisely managed.

It may be interesting to our readers to know that the Buffalo Forge Co. received orders recently for Buffalo Steel Pressure Blowers from the Thomson-Houston Electric Co., Lynn, Mass.; Edison Gen'l Electric Co., New York; Detroit Dry Dock Engine Co., Detroit, Mich.; Columbia Spring Co., Hess Spring Co., Cincinnati, O.; Kelley Axe Mf'g Co., Louisville, Ky.; Midvale Steel Co., Nicetowd, Philadelphia, Pa.

Am much pleased with THE FOUNDRY.

S. J. WRIGHT,

Minneapolis, Minn.

THE FOUNDRY

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

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JOHN A. PENTON, - - - - - SEC'Y-TREAS.

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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The Omaha News Company, Omaha, Neb.
The Pittsburg News Company, Pittsburg, Pa.
The Rhode Island News Company, Providence, R. I.
The San Francisco News Company, San Francisco, Cal.
The South West News Company, Kansas City, Mo.
The St. Louis News Company, St. Louis, Mo.
The Toronto News Company, Toronto, Ontario, Canada.
The Washington News Company, Washington, D. C.
The Western News Company, Chicago, Ill
The Williamsburg News Company, Brooklyn, E. D., N.Y.
The Wisconsin News Company, Milwaukee, Wis.

BACK NUMBERS.

WE can furnish back numbers for any month since THE FOUNDRY was issued, except September, 1892 and January, 1893, for ten cents each and in future will be able to supply all inquiries promptly.

"POURED SHORT."

THE circulation of this paper has been increasing by such rapid bounds as to amaze those who were conversant with the facts. When the January number was going to press such arrangements were made as we thought would insure plenty to fill all ordinary demands and leave 500 extra copies for use in the office and to supply the demand for back numbers, sample copies, etc., but in this we have been disappointed, as the entire issue has been absorbed and we have had to refuse a couple of hundred of inquiries for the January number, besides cutting short the allowance made to the news companies. We are very sorry for this and only print this notice in order that that those who were disappointed in not receiving the January number may understand the reason. It is something that is not likely to occur again and as all regular subscribers were served we are the principal losers.

INCREASE IN SUBSCRIPTION PRICE.

LET it be remembered that on and after March 1st, the regular subscription price for THE FOUNDRY will be $1.50, single copies 15 cents. Clubs of eight or more to have the privilege of having it sent to each individual address for $1.25 each. This step has not been taken hastily or unadvisedly, but has been rendered necessary by the great increase in size since the first number was printed, the improvements made since that time and those contemplated in the immediate future which will be noticed later on. Even at these figures THE FOUNDRY will be the best and cheapest magazine of its class in the country, and the knowledge that the foundry world already possesses as to its determination to adequately fill the long existing need for such a paper as shown by its work during the six months past and the thorough acquaintance of those who have it in charge with every phase of the business and the possession of all needed means and avenues of information for making it as readable and progressive as possible, ought to

be a sufficient guarantee that the future will see THE FOUNDRY in the very front rank of American trade journalism.

LOOKS LIKE A SWINDLE.

A FEW years ago when scientific research had brought prominently before the public the peculiar properties of the then but-little-known metal, called aluminum, and inventors had discovered cheaper methods of producing it than had hitherto existed, many most extravagant claims were made by enthusiasts and impractical men as to the wonderful changes that would take place in the mechanical world upon its coming into general use.

About this time a concern calling itself the Hartsfeld Furnace & Refining Company of Newport, Ky., commenced advertising liberally an aluminum alloy by the use of which, it was claimed, most extravagant results were attained, such as the producing of a mixture in an ordinary cupola that could be poured the same as cast iron and which could afterwards be tempered like steel or welded like wrought iron. The writer of this at one time visited the extensive (?) establishment in Newport where so many extraordinary things were being accomplished and found an old frame shed with a few foundry appliances but nothing to indicate that anything extraordinary was being done, an atmosphere of secrecy and mystery together with a high board fence, being the chief things noticable. Lately this concern has been again advertising itself in various ways and making more extravagant claims with a view of selling an aluminum alloy, said to be a veritable philosopher's store in the astounding nature of the results attained by its use, and here is where the swindle first shows itself. The printed literature so prolifically scattered about the country refers any doubtful reader to a number of well known foundries of national reputation all of whom have secured satisfactory results and in addition refer to individual chemists and foundry supply dealers, etc. A careful inquiry instituted by THE FOUNDRY among all these gentlemen has failed to bring us a single indorsement, while many are outspoken in denouncing the alloy and those engaged in placing it upon the market as a combination of frauds. Several letters we have received being to the effect that the use of this mixture had a very detrimental rather than beneficial effect. THE FOUNDRY is not actuated by any other desire than a wish to serve the interests of its readers and patrons, and the inquiry we instituted was inspired almost entirely by the receipt, at this office, of an advertisement which we declined to insert until we had made an investigation as to the merits of this so-called alloy. No advertisement will appear in these columns at any time of any other than responsible and reputable dealers and our readers and the foundry world generally, will be always protected from fraud of every description to the limit of our ability.

WHAT THEY SAY OF US.

Your publication for December received, and we have read it with considerable interest. Can you send us Nos. 1, 2 and 3? You can enter up our name as a subscriber for the year commencing January 1st.

A. A. GRIFFING IRON CO.,
Jersey City, N. J.

It is just the thing for our craft.

JAS. A. LYLE, Foreman Foundry,
Clinton Bridge & Iron Co.
Clinton, Pa.

I inclose you subscription for THE FOUNDRY. I think you will make a success of it.

C. T. HOLBROOK, Juniata Furnace Co.,
Philadelphia, Pa.

Please accept my congratulations upon the progres sand enlargement of THE FOUNDRY, you are exceeding my expectations and it affords me much pleasure to see the paper climbing upward so rapidly. THOS. D. WEST,
T. D. West Foundry Co., Sharpsville, Pa.

New York, Jan. 24, 1893.

Mr. Editor:

DEAR SIR.—Refering to the notes concerning large castings in Japan in your issue of Jan. 10, we send you as a matter of interest, information. In 1853 Mr. James R. Floyd of our firm cast 12 columns 51' 8″ high, 1" thick with caps and bases cast on. These columns were made in this city and erected for the support of the gas holder at the corner of Eighteenth street and Tenth avenue. They were all successfully cast without the loss of a single one.

In the same year a cast iron case for a gas meter was made in one piece, a cylinder 14 feet diameter and 12 feet long. 45 gentlemen sat down to dinner in it before it was taken out of the pit. How is that for America?

Yours truly,
JAMES R. FLOYD & SON.

THE MOLDER.

BY SWAB.

What tradesman is there in this land
Who's skill is oftener in demand,
Whose trade does date from ages back
The science of which many lack;
THE FOUNDRY'S to be the unfolder,
The educator of the Molder.

Let every tradesman lend a hand
To forward on this movement grand.
Brush off the "beam dust" from our shelves.
And by aiding others help ourselves;
Hand to hand and shoulder to shoulder,
Exchange experience for the Molder.

STEEL MOLDING.

Written expressly for THE FOUNDRY. (Fifth Paper.)

BY JOHN PETTIGREW.

WHEN we started in to make steel castings; we found that besides the shrinkage I have spoken of in a former paper, (viz., the shrinkage of the metal on itself being nearly twice the amount of cast iron, we have to allow $\frac{1}{4}''$ to the foot instead of $\frac{1}{8}''$). We had to provide for the interior piping, which is very much greater in steel than in cast iron, the metal being very much closer it had to be fed with much larger risers. These risers or feeding gates could not be kept open with a feeding rod as with cast iron for even if they had the heat all around from the ingots and vessels made it impossible for a man to stand and feed, and by the time a ladle was out of the way the head would be so thick a feeding rod could not have been got into it, and besides the gases left in the metal from blowing in endeavoring to escape would often keep the metal boiling out of the head till it covered the top of the flask in which case the sooner the head was chilled or solidified the better it would be for the casting and men. So instead of using a feeding rod we had to turn on the hose. In the course of time we found an element that by adding to the molten steel would eliminate the gases and quiet the steel. But still the piping would have to be provided for as was mentioned in a former paper, we had several sets of Rail Mill Pinions ranging from 23″ to 36″ in dia., at the pitch line, the smaller of these being a little over 8′ long, the neck when finished being about $13\frac{1}{2}''$ with a wabbler to suit. The first of these we cast we used a common water pail for a riser, but making the head 2′ long as we could not get a higher flask out of the foundry and the pouring crane would not rise any higher than 11″ we thought that would be high enough for all practical purposes, but when the sink head was cut off there was a nice round hole about 4″ in dia. and 18″ deep, although the top of the riser had set the casting, had fed itself in that way. On examination with a reflected light the hole was seen to grow gradually smaller till it terminated in a point and was nice and smooth all through. After this we dug a hole in the casting pit nearly 2′-6″ deep in which we put the flask, adding a riser to the top, but still at the increased depth we generally have a hole in the top end of the casting. In 1888 the company put in a Rod Mill, the pinions for which were 9″-10″-12″-and 16″, the designer of the mill having been used to iron pinions and the great trouble he had had with them hesitated a long time thinking we could not make pinions successfully in Joliet. On being pushed he decided to try them in steel but we could not get solid ends. Finally we had to abandon casting the wabbler on the top end and carried the riser straight through about 30″ longer than was needed before we could get this end as solid as they should be. Some of these pinions ran over 500 revolutions a minute, pulling from three to four rods at a time, any one acquainted with the great strain these have to stand appreciate the necessity of the strength of metal required. As in all other foundry work, different kinds of work have to be treated differently, and here the great advantage of having well-trained, thoughtful, intelligent, careful men, for it is a well-known fact that some molders know everything and are able to tell all the others in the shop just how to do their work, even to the time it ought to take to finish it, but they are so interested in others work that they generally make very bad work themselves, in fact have not time to think of their own work, because they are filled with the idea that that will come right anyhow and when it is not so the fault is never theirs, it is the core, the sand, the flask, the metal, or any other thing but their want of attention to their own work. Careful, reliable, honest work-

men are foremost men wanted in the steel molding trade, and they know just where to put the risers where they will do the most good, but in steel these want to be as near the center of contraction as possible and on the highest part that has any bulk, and it ought to weigh, at least, one-third as much as the casting; one-half would be better, the casting will be all the stronger as will be seen by a perusal of these papers. I have spoken chiefly of the early trouble we had in molding for steel and as we consider the business yet in its infancy we will watch with attentive care any development the future may bring forth as we are convinced there is yet a great future before it, the castings yet to be made will be more complicated than anything yet dreamed of. I remember when yet quite young, seeing the early made cotton machinery broken up to make room for that of more recent date; these did not have a bead molding or anything thicker than the plain frame except where there was a bearing.

The contrast between the early designs of these machines, made nearly 100 years ago, and those highly finished engines now used for the same purpose show us the great advancement we will yet make in this branch of the molders art.

A LARGE PATTERN M'F'G CONCERN THROWS DOWN THE GAUNTLET.

CLEVELAND, Ohio is a large city, noted for many things, among them being its beautiful parks, fine avenues, handsome residences and the extent and variety of its manufactures, but it may not be generally known that it also contains what is claimed to be not only the largest pattern manufacturing establishment in the country, but one that its proprietors claim does more work than any three others combined. Evidently this has been disputed by some one, and as a result, the Gobeille Company have put out the following unique circular, printed in colors in the highest style of the printer's art:

CLEVELAND, Ohio, Jan. 14, 1893.

Every manufacturer knows the advantage of a large output and the relation of "Volume of business" to "Fixed Charge." It is unnecessary to waste time discussing it.

We are doing more business than any three pattern shops in this country. It would be of great money value to us if we could put this *fact prominently to the foreground of your* memory. Now, it is vague and indistinct, because some of our competitors deny it—they are honest in that denial; they really think we are lying. Well, we have hit on a plan to prove our position. Read the following and see if it is not a fair proposition.

Respectfully,

THE GOBEILLE PATTERN CO.

ISN'T THIS A FAIR CHALLENGE?

In the year 1892 we did more business in the manufacture of wooden patterns for castings, as shown in hours on the pay-roll, than any three other public pattern shops in the United States, combined.

We respectfully request any three shops, as above, to contest this statement on the following conditions:

1st. Each party, within thirty days from date, shall sign this contract and deposit One Thousand Dollars ($1,000.00) with the National Bank of Commerce, Cleveland, O.

2nd. We will choose one man, those contesting one man; these two shall select a third. These three shall scrutinize all necessary books of account and decide the question at issue. The signature of any two shall be sufficient to make the award and transfer the Two Thousand Dollars ($2,000.00) as dictated in section 4.

3rd. The expenses of the investigation shall be borne by the four concerns interested *pro rata*, and not be a charge on the forfeit money.

4th. The party found entitled to the award shall receive back the One Thousand Dollars ($1,000.00) deposited as above, together with a written statement of the actual status of each concern. The One Thousand Dollars ($1,000) remaining shall be paid out as follows:

One-third ($333.34) to "The Cleveland Protestant Orphan Asylum;" one-third ($333.33) to "The St. Joseph's Orphan Asylum," (Catholic); one-third ($333.33) to "The Jewish Orphan Asylum." All of Cleveland, Cuyahoga County, State of Ohio, U. S. A.

NOTE.—Our attorneys consider every condition fair excepting the disposition of the One Thousand Dollars ($1,000.00), which goes to this city in any event; but this is *our* proposition; the town has been good to us, and we shall not deviate from the above in any particular.

Signed,

THE GOBEILLE PATTERN CO.,

JOS. LEON GOBEILLE, General Manager.

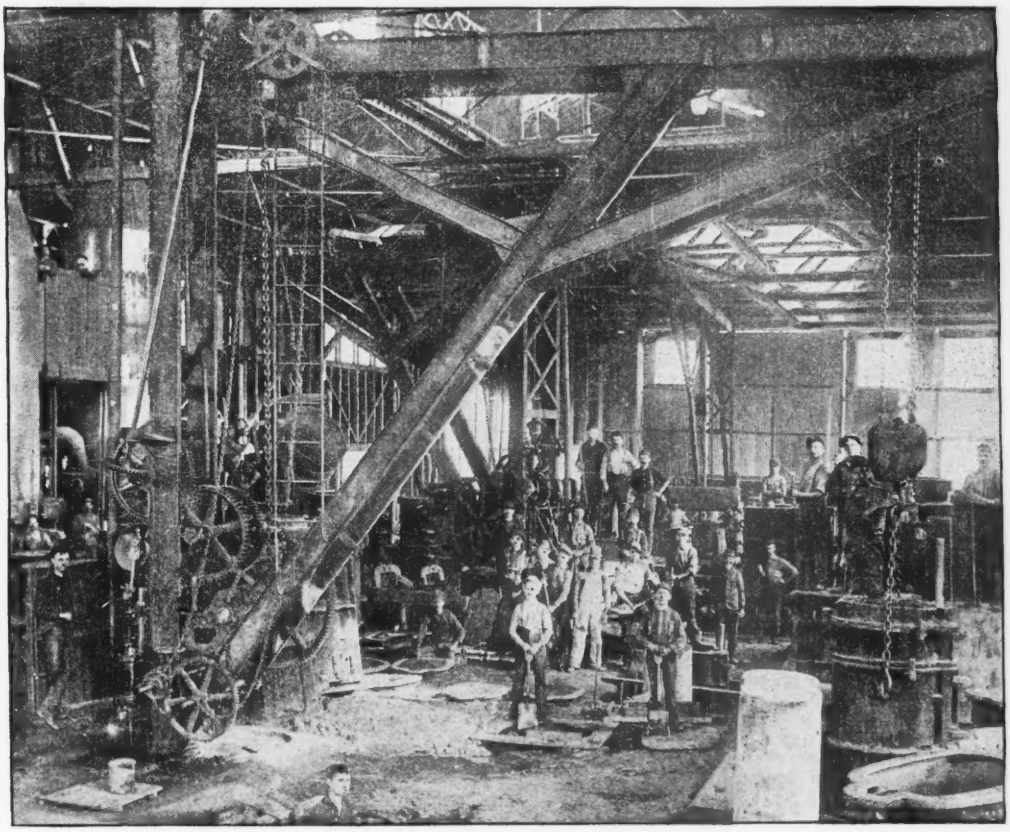
To Whom it May Concern:

We consider the above to be a bona fide contract, signed by us as parties of the first part,

and shall account ourselves holden for the performance of the same, without quibble or equivocation.

S. T. WELLMAN,
President of the Company.

If the competitors of the Gobeille Pattern Co. allow the foregoing to go unchallenged it would look very much as if the result would be large-sized advertisement for the latter as the proposition is apparently fair enough.



INGOT DEPARTMENT.

THE accompanying illustration shows the ingot department of the T. D. West Foundry Co., situated at Sharpsville, Pa. The buildings are all of iron. The department for general and shop castings being supplied with hand power cranes and every convenience for turning out work economically. The part of the plant most likely to interest the reader is the ingot department shown in the illustration, and which is equipped in the best possible manner with modern tools and machinery. All the cranes in this department are constructed of iron and are operated by steam. They are of the jib type and hoist, lower rack and revolve by power. Height of masts, 24 feet; length of jibs, 31 feet. The molds are dried in ovens, the cores in pits, which, by the way, is a plan having many advantages over the ovens which are used elsewhere for such work. One side of the shop is given up to the ovens and storage rooms, the other side contains cupolas, engine, reparing machinery, pattern and blacksmith shop and superintendent's office. The iron and fuel is conveyed by buggy loads pulled by a small locomotive to the elevator. The plant being located within 200 feet of a blast furnace there is every opportunity for the selection of iron which is delivered in two-ton lots,

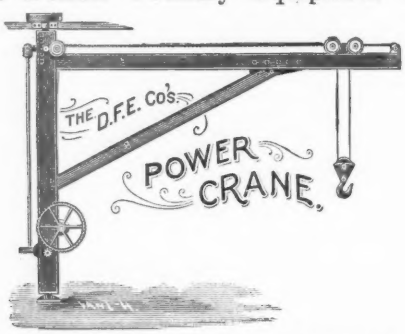
and each load is analyzed thus, giving a more accurate control of the analysis of the iron in molds than is possible when received in twenty-ton lots, as is the custom. It is their intention to use the metal direct as soon as the furnace starts up. At each tap of the furnace the liquid metal will be run into two ladles placed on cars and pulled by locomotives under the power cranes in the foundry. The metal will then be treated and when right hoisted and poured into the molds. The castings are handled by a crane which lifts them from the cleaning room and places them into cars ready for shipment. Their ingot department is certainly well equipped for making ingot molds economically. All the steam and hand-power cranes, ladles and trucks used in their foundry were built and erected by the Phœnix Iron Works Co., of Cleveland, O.

Your publication for December received and we have read it with considerable interest. Can you send No. 1, 2, 3? You can enter up our name as a subscriber for the year commencing January 1st.

A. A. GRIFFING IRON CO.

A BELT-POWER CRANE.

The belt-power crane shown in the accompanying cut is manufactured by the Detroit Foundry Equipment Co.



and is designed to be used largely in place of the ordinary hand power crane. It can be built in any style or capacity and is especially suitable for cranes requiring high speed and lifting medium light loads and can be operated by either belt or rope power, but its great advantage consists in its cheapness and the convenience with which it obtains the necessary operating power. The belt or rope can be run from the same shaft that drives the blower in the foundry or the lathe, or other machinery in the machine shop, and in rolling mills forges, steel works, or shops having convenient shafting, it is without doubt a very efficient and convenient power crane. The crane can be arranged to hoist alone by power or to hoist rack and swing. It is also designed to be operated by hand-power in case of emergency. Its cost in medium capacities is but slightly in excess of a hand-power crane, and when consideration is given to the labor saved in operating such a crane, it would seem that in the end it was very much cheaper than hand-power. This firm have several of these cranes in operation in this city and elsewhere. In the foundry of the Detroit Pipe & Foundry Co., they have five, ranging in capacity from three to ten tons, and they are giving good satisfaction.

THE NEW ENGLAND MAGAZINE AT THE FRONT.

The fine literary illustrated magazine of Boston.

Able critics say it is one of the most interesting magazines published in America.

A great favorite with New Englanders, and they are everywhere.

Local only in name.

It is the people's favorite.

To see this magazine is to want it.

Its circulation has doubled the past year.

It is unique, containing American Legends, Traditions, History, Story and Poetry.

A conspicuous feature of the Magazine, the treatment of the great American Cities, will be continued.

SOME OF THE ATTRACTIONS FOR 1893.

Harvard College 50 years ago, New England Towns 40 years ago, by Rev. Edward Everett Hale; Vassar College, Society Life in Amherst College, Manual Training in America, Rhode Island in the Revolution, Brother Jonathan and his Home, Whaling and Fisheries

of the United States. Each number contains several interesting stories and poems. Price, $3.00 a year; 25 cents a copy. Sample copies sent to any address free. Agents wanted. Address, NEW ENGLAND MAGAZINE, Boston, Mass.

THE FIRE FIEND.

At Elkland, Tioga Co., Pa., the foundry of Bailey Bros. was burned.

Pailey's foundry at Elkland, Pa., burned Jan. 7th.

Winegard's foundry at Coxsackie, N. Y., was burned Jan. 4th.

The foundry of the Vulcan Brass Works, Cleveland, O., burned Jan. 16th. Loss, $12,000.

McKernan & Denver's foundry was burned in Washington, Ind., Jan. 14th. Loss $3,000. Insurance $1,100.

The foundry of the Penn. Hardware Works at Reading, Pa., was destroyed Jan. 22nd. Loss $3,000. Caused by incendiary.

The large foundry of Robinson, Rea & Co., at Pittsburgh, Pa., was destroyed by fire Jan. 1st, together with a lot of valuable patterns. Loss $500,000, fully insured.

Winslow Bros.' foundry, pattern room and blacksmith shop in Chicago were damaged by fire to the extent of $10,000, Jan. 27th. The firm is doing the ornamental work for the gallery of fine arts and the Mexican building at the World's Fair.

The student in foundry matters would find something of interest in the foundry of Brown & Patterson, Marcey avenue and Hope street, Brooklyn, N, Y., where a specialty is made of piano plates for upright pianos. Sixty-four plates are cast a day when the foundry is working in its full capacity; all iron flasks are used, being handled by an overhead track extending from one side of the shop to the other, directly over the floors below and each man has a small travelling crane of his own. No facings, whatever, are used on the molds, the castings being cleaned in six large tumbling barrels which are located in a separate building on the opposite side of the yard to the foundry.

These barrels are about six feet square at the end, with a hole in the center about five or six inches in diameter to receive the shaft which is hollow; the sides are about two feet wide, one of them being arranged convenient for removal and serves as a cover or door; each mill holds seven plates and sufficient cast iron shot to remove the sand while they are being tumbled. An ingenious device is used for removing the dust from the mills which would otherwise almost suffocate the workman; it consists of a suction blower working in connection with pipes attached to the hollow shafts of the mills with a discharge pipe leading into the yard where the dust is deposited without giving annoyance to any of the workmen and leaving the castings "as clean as a dollar." Mr. John Alexander, the foundry foreman, informed a representative of THE FOUNDRY recently, that while the mills had cost a lot of money, the result had been most satisfactory, as large sums of money were saved yearly which would otherwise be spent for lead and charcoal, to say nothing of time and labor in applying these facings to the molds and printing patterns back and in the end the casting present a better appearance when japanned and bronzed. Mr. Brown, the head of the firm died about the middle of November last, and the foundry was closed during the holidays to take stock, but work was, however, renewed on Jan. 11, and will continue under the same name.

We think you have struck the right thing, keep it up; you should have a great success.

UNION FOUNDRY & MACHINE CO.,
Pittsburgh, Pa.

TRANSFERRING HANDWRITING TO IRON.

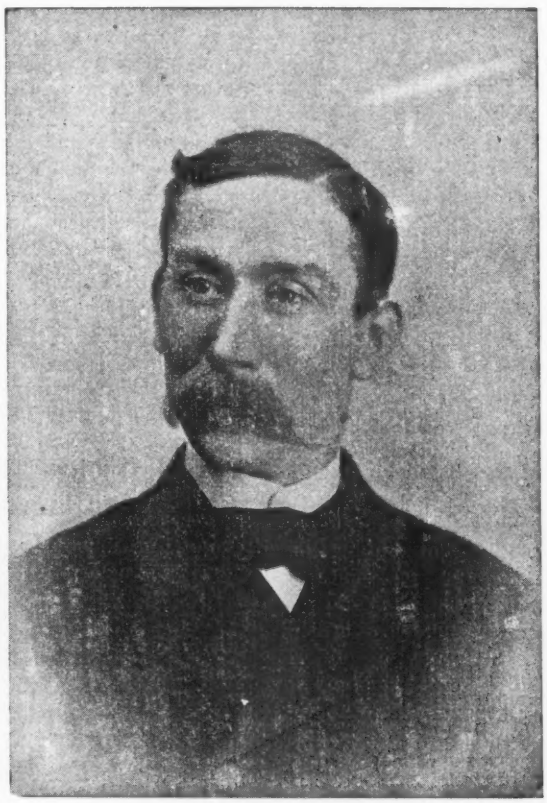
AN article in a continental journal recalls the incident of the invention of a method of transferring handwriting to iron. A Boston founder noticed one day that a ticket which had accidentally slipped into a mold lightly transferred its type to the iron. He followed up the hint thus afforded him, and procured a heat proof ink, with which he wrote invertedly on ordinary white paper. This paper he introduced in the mold before the molten iron was poured in. When the mold cooled it was found the heat had consumed the paper, but that the ink, which remained intact, had left a clear impression on the iron.

The Meridian Foundry & Machine shop have assigned. Liabilities $25,000, assets $40,000.

The North Western Stove Company who have leased the labor of the convicts in the Salem, Oregon, penitentiary, have paid from 1883 to 1892 to the state, the sum of $166,366.42.

RICHARD BROWN.

THE subject of this sketch may not have as world-wide a reputation as other foundrymen in America, but it is doubtful if there are any more worthy a place in THE FOUNDRY'S gallery, and if skill as a practical foundryman, knowledge of human nature, and ability to successfully handle men and turn out the most difficult and complicated work, were the standard by which honors in the foundry business were awarded, no one would rank higher than Richard Brown, superintendent of the foundry department of the Morgan Engineering Company, Alliance, Ohio. He was born July, 1849, at Ironbridge, Shropshire, England. Ironbridge may seem a curious name for a town, but it was called that after the bridge that crosses the river Severn at that place, and which was the first iron bridge ever built by the famous Coalbrookdale Works at that place and was erected in 1779. In this establishment Mr. Brown commenced work at the early age of seven years, leaving at the age of eleven to go to Ebbervale, Monmouthshire, South Wales, where he remained for two years; from there to London, England, for four years; then to Barrow-in-Farness Lancashire, England, where he worked at the famous establishment of Westray, Torster & Copland, Hydraulic and Marine Engines, where he remained fourteen years and there to this country, where after working but six months as a journeyman, he was offered and accepted his present position, filling it in a manner alike creditable to his employer and himself.



RICHARD BROWN.

As a foundry manager, Mr. Brown has an individuality all his own which shows itself perhaps more prominently in the treatment of those under him than in any other way. While a firm believer in necessity of dicipline and order where large interests are at stake and while exacting in the enforcement of the rules of his establishment, he possesses not alone the confidence and esteem of those under him, but in many cases, judging from the remarks we have heard, there exists a bond of positive affection between him and his employees. Remembering that civility costs nothing and that politeness can be used as effectually in the foundry as elsewhere, Mr. Brown never permits any of those under him to fear him but treats all with a degree of courtesy not usually found in the foundry. Profanity is strictly forbidden, intemperance is not tolerated, and every man is expected to do a fair day's work and is given every opportunity to do it comfortably. That a high degree of skill is required by all from Mr. Brown down, it is only necessary to mention some few of the important pieces of work that have been turned out of this foundry while it has been under his management.

A twenty-five ton double-acting steam Hammer for the Midvale Steel Works, Nicetown, Pa., which strikes a blow of many tons, the anvil alone weighing 300 tons, made in seven sections, two housings made in four sections,

each weighing about 33 tons. Cylinder 4 feet 2 inch bore, 12 foot stroke weighing 25 tons, the valve casing to operate it weighing nine tons. A gun carriage for the United States government to test their 12 foot guns, the housings two in number weighing 27 tons, counterweights each weighing 32½ tons.

Also a hydraulic shear, the bed-plate weighing over 41 tons for the Carnegie Steel Co. at Homestead, Pa. Also three of the largest shears in the world for the same firm, which will cut a cold steel plate 11 feet wide and 1½ inches thick, each one weighing 150 tons, etc., through a list that might be spun out indefinitely, but which we would just mention to give an idea of some of the work built under the superintendence of the subject of this sketch and which show the degree of perfection to which the foundry business is being brought in the nineteenth century.

GRAND RAPIDS, MICH., NOTES.

The foundries are nearly all in a prosperous condition.

Hartman & Son have rebuilt their foundry and are doing a good busines in general jobbing. H. Hartman, foreman.

Rempis & Galemeyer are having a rushing trade in wagon and sleigh work, they are also doing considerable brass casting and general jobbing.

The Grand Rapids M'f'g Co. are getting ready for a good spring and summer trade. Their work is principally agricultural work. Geo. Clark, foreman.

The Fox Machine Co. are doing a thriving business in wood working machinery and jobbing. Shade Hendershott is their foundry foreman.

The Grand Rapids School Furnishing Co., are running their men on half time, but soon expect to be running again on full time. Robt. McGee is the foundry foreman.

The Haney School Seat Co. have shut down for a short time repairing their boilers and getting ready for a large contract of school seats granted them by the board of education of Chicago.

Perkins & Co., manufacturers of shingle mill machinery are very busy and have a large stock of orders ahead. They are in need of a new foundry to keep pace with their large and finely equipped machine shop. W. S. Anderson is their foreman.

The Vulcan iron works are running full force making castings for locomotive and car repairs. J. Fothergill, foreman.

The Grand Rapids Brass Co. are doing a fine business, and are working all the men possible to keep up with their orders.

McKay & Co. have remodeled the old brass foundry and machine shop and are having a good trade in wood working machinery and general jobbing.

Toledo, O., Jan. 26, 1893.

MR. EDITOR:—THE FOUNDRY comes to me regularly every month and I must say that it is the best journal of its kind that can be secured and should be subscribed for by all molders and men who are connected with a foundry or machine shop. My position is storekeeper and time keeper in a foundry and I often wait on a customer who will ask me a good many questions about castings, why they shrink, crack, etc., and I was always unable to answer the questions right as I never made it a practice of learning these things until I received the first FOUNDRY, when I read it I learned a few points and could hardly wait until the next came to see what it contained, and so on, and can say that I have learned more in reading the three numbers I have received than during all my connection with a foundry.

Very respectfully yours,
H. D. KAHLO.

The Berlin Iron Bridge Co., of East Berlin, Conn., have received the contract for rebuilding the Tube Mill of Curtis & Co., at Cohoes, N. Y., lately destroyed by fire. The new plant will be fire-proof, constructed entirely of iron and brick, no wood work being used. The building will be 132 feet wide by 131 feet long, with a wing one side 20 feet wide by 74 feet long.

AMONG THE FOUNDRIES.

The Globe Iron & Foundry Co., have been incorporated at St. Louis, Mo. Capital stock $4,000, all paid in.

The Everett Foundry and Machine Co., Everett, Wash., will be ready to open their foundry in February, 1893.

The Tacoma Foundry and Machine Co., Tacoma, Wash., recently sold their entire plant to the Puget Sound Dry Dock Co., who are making heavy jobbing and marine work a specialty.

The Chicago Foundry Supply Co., Chicago, has certified to an increase of capital stock from $75,000 to $100,000.

The Youngstown, O., foundry of John Miller is being run to its full capacity. A specialty is made of chilled rolls.

The foundry business conducted by J. F. Elderlin, at Aberdeen, Miss., will hereafter be run by Elderlin & Company.

W. W. Kelsey, whose foundry was burned a short time ago in Windsor, Vt., is now ready for business again.

At Henry Ruggles' foundry, Poultney, Vt. they recently cast a planer bed weighing 5,000 pounds, the heaviest piece made there in eight years.

The Birmingham Foundry at Ansonia, Conn., has just completed a shear weighing 30 tons that will cut a piece of cold iron four and one-half inches thick.

The Nashua Iron and Brass Foundry, Nashua, N. H., have secured the contract for several thousand machines of the nickle-in-the-slot variety for the manufacture of postage stamps.

The Farrell Foundry & Machine Co., of Ansonia, Conn.. have a sick benefit insurance in connection with their works, and during 1892 paid out $1,974.25 in benefits, $50 of which was donated by the Farrell Co.

Pankow Bros., five of them are proprietors of the Sioux Falls foundry, which keeps every member of the firm busy, and half a dozen of other workmen beside. The foundry has made rapid improvement year by year, and the firm has property now which is worth from $75,000 to $100,000. This foundry is now get ting out the iron columns for the South Dakota building at the World's Fair.

The new foundry of Frank B. Foster & Co., Boston, is nearly completed. It is 95x237 feet.

A bell weighing 600 pounds is being made at the foundry of Clinton H. Meneely & Co., of Troy. It is to be a gift of the Seventh Regiment, New York, to the United States cruiser, New York, in honor of the naming of the vessel for New York city. Much silver is added to the composition in the bell, which will doubtless be one of the handsomest ever sent out from the fouudry.

Shall be pleased to receive THE FOUNDRY. I think it is a step that should be appreciated.

J. E. CHURCH & SON,
Iron Founders, Holly, Mich.

NEW FOUNDRY ENTERPRISES.

E. D. Noyes' new foundry at Portland, Me., is nearly ready for operation.

The new car wheel foundry which J. H. Bass will erect at Lenoir City will be 800 feet long.

Goodman & Son are building a foundry at Waterloo, Ia.

The Bozeman foundry, built by Messrs. Wesleder & Nortmand at Bozeman, Mont., is now running.

It is understood that Minneapolis, Minn., is to have a new foundry with a capital of $150,000, Chicago parties being largely interested.

The New York Car Wheel Co., of Buffalo, N. Y., have purchased the ground and will erect a foundry near Waltham, Mass.

Dr. Hembold and associates will establish a foundry to manufacture light and heavy castings of iron and brass at Newport, Ky.

The Tynan Machine & Foundry Co., have been incorporated at Savannah, Ga., with a capital stock of $50,000.

The Kelly Foundry & Machine Co., Goshen, Ind., have purchased the Globe Implement Works for $10,000 and have got one of the finest foundries in the state.

PERSONAL MENTION.

James B. Taplin, senior member of the firm of Taplin, Rice Co., died of erysipelas Jan. 23rd.

Jonathan Weir, a prominent foundryman of Moncton, Nova Scotia, died January 21st in his sixty-ninth year.

Elmer Weaver has been appointed superintendent of the Bethlehem Foundry & Machine Company's works at Bethlehem, Pa. He succeeds Mr. Kent who resigned to take charge of the National Machinery Co., in Tiffin, Ohio. Mr. Weaver is from Elmira, N. Y., and has been foreman of the foundry in that city for some time. Being a thoroughly practical young man his promotion is deserved.

Joseph Peoples, a well known foundryman of Philadelphia, died Jan. 19. He was a native of Ireland and came to America in 1842, where he served his apprenticeship as an iron molder, working for several of the most prominent stove founders of that city. He became later a member of the firm of Steel, Van Rossum & Co., which became afterwards the Geo. P. Steel Iron Co.

Messrs. W. J. Willits, L. B. Place and E. B. Linsley of the Sheffield Velocipede Car Co., Three Rivers, Mich., have leased the foundry of the Kerr-Murray M'f'g Co., at Fort Wayne, Ind., for a term of years and have started it up. The foundry has a complete equipment for gray iron work of all kinds and has already some important contracts on hand.

NEW YORK AND VICINITY.

At the brass foundry of Mr. David Wilson No. 513 West Thirty-third street, New York City, four sets of brass bearings have been cast recently for the W. & A. Fletcher Iron Works at Weehawken, N. J., where the machinery is being constructed for a new steamboat that will be the largest the Fall River Steamship Co. has ever built. They are for the main beams for this crank shaft. They are remarkable for their size and the method of molding them. Four pieces go to a set, top, bottom and two side pieces. The top piece, which is the heaviest, required about 2,600 weight of metal to cast it. A full set when ready for the machine shop weighed over two tons. The length of bearing is 30¾", diameter of base 26". The molds were made with Albany sand furnished by the Whitehead Bros. Foundry Supply Co., of New York City, and faced with a lead supplied by the same firm, and were skin dried. The metal was melted in four Gantier crucibles having a capacity of 1,000 pounds each, the furnaces used were of the square type and five hours was about the average time required to melt for one of the largest pieces. Just before the metal was ready to pour, a crane ladle about thirty hundred weight capacity with a charcoal fire in it, was placed convenient to the mold and the tin and other parts of the composition that did not require to be melted in the crucibles, was placed in it to get warmed up. After the crucibles were taken from the furnaces their contents were dumped into the crane ladle, the whole composition was then thoroughly mixed and the casting poured. The castings thus produced presented as good an appearance as any similar ones that the writer has seen made in dry sand or loam during an experience of 20 years in the foundry business. Mr. David Wilson's experience in brass founding dates back in the fifties, and he has acquired considerable reputation for furnishing a first class bearing metal. The Fletcher Co. and others noted for construction of marine machinery, are among his customers.

Otto Schultz & Co., metal founders, have recently built and are now occupying a foundry at North Henry street, near Norman avenue, Brooklyn, N. Y. The molding shop is 47x80 feet. Iron will be furnished from a 46" cupola of their own design and a No. 4 Root blower. The are prepared to make castings in copper, brass, tin. spelter, lead, iron and all kinds of composition. Dies, gears and pinions are to be made a specialty.

The old established foundry of Mr. Abraham Ayres at Forty-fifth street, near Tenth avenue, New York city, was closed on Feb. 1st. Mr. Ayres is nearly 80 years old and has been prominent in the foundry business in that city since 1853. He made a specialty of architectural and street railway castings and usually employed between 25 and 35 molders; the capacity of his foundry was about 12 tons daily, the average cast was seven or eight tons. Mr. Ayres is retiring from the business on account of his advanced age and disinclination to devote the time and attention that is required to make it pay in these days of keen competition. The establishment is offered for sale or to let on reasonable terms.

The brass foundry connected with the Henry R. Worthington Pump Works at South Brooklyn, N. Y., has had almost 50% more work on hand for some time past than they had capacity to handle. There has been about thirty hundred weight cast daily and the balance was given out to jobbing foundries in the vicinity. During the last four years Mr. Thos. Bilth, the foreman, has entirely changed the system of molding the light castings, previous to that time the sand match was the method, now metal match plates and patterns with set gates are used for everything that can be made that way. The question of building a new foundry with a capacity equal to the increasing demand has been occupying the attention of the managers of the works for some time, as yet nothing definite has been decided upon.

At the Globe Iron Works, operated by Edward C. White & Co. at Thirty-fourth street, near Eleventh avenue, New York city, a new order of things seems to have been inaugurated. A full complement of molders has been at work in the iron foundry for the last three months and the facilities therein have been improved recently by the addition of a wing that was formerly used for a chipping shop, the space added is 20x60 feet. Some light jobbing work is done, but a specialty is made of all kinds of castings for street cars and street

railways. Among their customers is the well-known firm of John Stephenson & Co., manufacturers of street cars in New York City.

It is an easy matter to form an idea of the amount of work on hand at the foundry of E. W. Bliss & Co., Brooklyn, N. Y., after you have been told that Mr. Shinton, the foreman, can scarcely find time to read THE FOUNDRY.

Messrs. Mecklenburg & Jennings have established a jobbing foundry at Fourth avenue and One Hundred and Thirtieth street, New York City, both men have had considerable experience in that line, having been employed for a number of years (Mr. Mecklenburg in the capacity of superintendent) at the Conovar jobbing foundry, which was operated for a long time at East Twenty-eighth street, New York City.

From the standpoint of a citizen of the United States who is interested in good government and an honest administrator of all the mechanical departments of the government works, it is gratifying to see the results that have been obtained during the last two years in the construction of the machinery for the United States cruisers Raleigh and Cincinnati at the navy yard in Brooklyn, N. Y. Among the departments that have assisted in the construction of this machinery, none has had a more difficult task to perform than the foundry. The castings have been of the most intricate character and the mixtures of metal of the highest grade. Mr. Wm. Forbes, the master molder, has had his skill and experience taxed, devising methods for molding these castings and suitable mixtures of iron and composition to stand the severe tests which their requirements made it necessary to subject them to. The method of molding and casting the cylinders for the triple expansion engines, which both cruisers are to be supplied with, has been described in an article written by an official of the United States Navy department. The frames for the engines were to be cast in steel. After the patterns were made it was decided that good results could not be obtained by the use of that metal on account of its tendency to shrink and crack when used for a casting of intricate design, Mr. Forbes proved equal to the emergency, and melted up some old cast iron guns in one of his reverberatory furnaces and poured them with the metal thus obtained, the results were entirely satisfactory. The propellers have three blades which are separable and cast with an ordinary composition of brass. The hub or center, which weighs three tons, was cast in manganese bronz, the alloy being prepared by Mr. Forbes; the melting was done in a reverberatory furnace and the casting when cleaned up in the machine shop, showed a nice clean surface. Another nice piece of work are the immense round condensers which are about thirteen feet long and made in three sections; the two end sections are five feet long, the diameter is six feet and the thickness ¼" excepting at the flanges where they are bolted together, the thickness there is about ¾". The composition from which they were cast is similar to the softer grade of metal used for valves. They were molded in loam and the lightness of the casting made it necessary to use great expedition in removing the bricks from the cores and other parts of the mold in time to prevent them from cracking as the metal began to shrink.

The work is nearly completed now and it is to be regretted that there are no other jobs in view at present that would be likely to keep the boys (who have rendered such good account of themselves) employed.

Advertisements inserted under this head for 25 cents a line each insertion.

SPLENDID OPPORTUNITY TO RIGHT MAN—There is no foundry in Weeping Water, Neb, while a great many castings are used in the vicinity. The right man can make money by starting now. If necessary power, land and building will be furnished. Address, CHASE M'F'G. Co., Weeping Water, Neb.

FOR SALE CHEAP—In Paw Paw, Mich., on Toledo & South Haven R. R., a small Foundry and Machine Shop the latter doing good business and the foundry only needs a good man to work up a steady trade; everything complete; good chance to right man. Address, A. J. Sabin, Paw Paw, Mich

FOR SALE—In a thriving Missouri town, situated on the C. B. & Q. R. R., a complete foundry and machine shop, outfit as follows: One 26" and one 30" cupola, latest design, crane, core-oven with carriage 4'x20', one brass furnace (new), one large tumbling barrel, large supply of flasks, ladles, facings, sand, tools, etc, and an extensive line of patterns for architectural, engine, jobbing work; one 12-horse-power engine in good condition, one 12" engine lathe with all attachments, one upright drill 30" (new), one 2" pipe machine, emery stand, a large grindstone, portable forge (new), a lot of blacksmith's tools, woodturning lathe 12" all iron, jig saw (new), cut-off saw, rip saw, woodworking tools, etc., together with a good stock of plumbers goods and mill supplies and a supply of coke and iron; all in first class condition and can be purchased for one-fourth its cost. Address, Chas. Gibbert & Son, Albany, Mo.

FOR SALE—Foundry and Machine Shop in a flourishing manufacturing city; a good farming country and a small capital required. Address, WM. ENGBRING, Cedarburg, Wis.

The Brassworker published by and in the interest of the International Brotherhood of Brass workers, comes to us in a neat octavo form this month; sixteen pages and cover; its whole appearance and make up show unmistakeable signs of prosperity, and reflect great credit on its editor C. C. McGlogan.

THE FOUNDRYMENS ASSOCIATION

MINUTES of the twenty-first meeting of the Foundrymen's Association held at the Manufacturers' Club, Philadelphia, Wednesday evening, February 1st, at 8 o'clock.

In the absence of the President, the Vice-President, Mr. Thomas Devlin, was Chairman of the meeting.

The minutes of the last meeting were read and adopted.

The following persons were present:

P. D. Warner, Mellert Foundry & Machine Co., Reading, Pa.; Geo. P. Smyser, E. O. Smyser's Sons, York, Pa.; Geo. Rockett, Morris, Tasker & Co., Incorporated, Philadelphia; John R. Collingworth, Robt. Wetherill & Co., Chester, Pa.; Wm. M. Winks, Davis Coal & Coke Co.; John Brown, Crown Smelting Co., Chester, Pa.; W. H. Fairlamb, Wilmington, Del.; G. R. Robinson, G. Robinson & Co., Philadelphia; Harry Robinson, G. Robinson & Co., Philadelphia; Thomas Glover, Glover Bros., Philadelphia; Wm. Braun, Jno. Braun & Sons, Philadelphia; L. B. Whitney, A. Whitney & Sons, Philadelphia; Chas. Whitney, A. Whitney & Sons, Philadelphia; Alfred D. Poole, J. Morton Poole Co., Wilmington, Del.; W. R. Briston, J. Morton Poole Co., Wilmington, Del; E. K. Brown, E. K. Brown & Co., Philadelphia; John L. Delaplain, U. S. Foundry Co.; Leslie Criscom, Pennsylvania Diamond Drill & M'f'g. Co., Birdsboro, Pa.; T. B. Harkins, T. B. Harkins Foundry Co., Bristol, Pa.; Josiah Thompson, J. Thompson & Co., Philadelphia; W. H. Hunt, William Adams & Co., Philadelphia; Thos. F. Maher, Goodell & Waters, Philadelphia; H. M. Kolb, Lansdale Iron Works, Lansdale, Pa.; Thomas Hobson, *Iron Age*; Geo. A. Messick, Pusey & Jones Co., Wilmington, Del.; S. G. Flagg, Jr., S. G. Flagg & Co., Philadelphia; Thos. Devlin, Thomas Devlin & Co., Philadelphia; Louis McGrath, Thomas Devlin & Co., Philadelphia; E. B. Marah, S. Baltimore Foundry, Baltimore, Md., Andrew McCardell, Pond Machine Tool Co., Plainfield, N. J.; Jas. S. Stirling, Harlan & Hollingworth Co., Wilmington, Del.; E. E. Durant, G. F. Warner M'f'g. Co., New Haven, Conn.; H. G. Vansant, Morris, Tasker & Co., Incorporated, Philadelphia; A. W. Howe, Philadelphia; Jones Wister, L. & R. Wister & Co., Philadelphia; J. N. M. Shimer, L. & R. Wister & Co., Philadelphia; H. M. Bougher, J. W. Paxson & Co., Philadelphia; Howard Evans, J. W. Paxson & Co., Philadelphia.

The executive committee reported upon the matter of presenting castings and getting prices thereon and decided to ask bids on the same castings which were presented at the December meeting, sending a postal card with a blank place left for the price to be inserted and returned to the Secretary that the average price could be determined. This committee was under the impression that the presentation of castings and the asking of bids for the same was in interesting subject, as it is noticed that all persons who attended the meetings examined the castings, which led to a considerable amount of discussion. After the bids have been received, however, the matter will be taken up further, and if it is found that but a few answers have been received it will be well to discontinue.

In regard to the price committee, your committee thought best to have it further ventilated at the regular meeting, thinking that it might be objectionable to some foundrymen to have their bids known.

The subject of coke will be continued.

Mr. Walter Wood arranged with Mr. Jones Wister of L. & R. Wister & Co., to make an address and present samples with analysis of different kinds of coke and coal before the February meeting.

The railroad and freight committee reported progress.

The Treasurer reported a balance of $53.89 up to date after all bills are paid.

The following new members were elected:

The Chalfant M'f'g. Co., hardware and small castings, Lancaster, Pa.; The Frick Coke Co., Pittsburgh, Pa., represented by J. Ogden Hoffman, with office at Philadelphia; The Pond Machine Tool Co., Plainfield, N. J., represented by Andrew McCardell, foreman; Novelty Iron Works, Mr. D. R. Kline, general manager, Allentown, Pa.; Justin J. Pie, General Foundry, Osceola Mills, Pa.

Under new business after a discussion in regard to the committee to ascertain the current price or prices at which castings are made in the open, market, etc. Mr. P. D. Wanner made a motion which was seconded by Mr. Geo. P. Smyser, that a committee of five, representing the different branches of the foundry trade, be appointed to be known as the price committee, to be appointed by the President and Secretary,

said committee to meet half an hour before each regular meeting and report prices at which contracts have been taken for castings, that the foundry men will know the market prices for castings in general.

Mr. Wanner stated that contracts were given out by the city of Philadelphia for cast iron pipe at as low as one cent per pound, which is lower than ever before and in fact it would be impossible to make a living profit at that price. The idea that large concerns could take castings at this price better than small concerns was a mistake. The inquiry is naturally made where this thing was going to stop? On top of this came the information that a bid was put in for castings for the water department of Philadelphia at $1.44 per 100 lbs., and the contract was lost at this figure.

While this association does not interfere with prices and it is not their intention to make a card price, we are working in the interest of foundrymen and getting information of value to them to show, if possible, what their castings cost to make, hoping in the end to teach them the folly of selling their product below cost. The impression seems to be that the foundrymen of to-day are too anxious to take work, lacking back-bone and allowing the customer to dictate prices.

The following committee were appointed to serve as the price committee named above:

P. D. Wanner, chairman, Mellert Foundry & Machine Co., Reading, Pa., representing cast iron pipe; Geo. P. Smyser, E. G. Smyser's Sons, York, Pa., representing architectural work; S. G. Flagg, Jr., of Stanley G. Flagg & Co., representing hardware and malleable castings; L. B. Whitney, of A. Whitney & Sons, representing car wheels; G. R. Rebmann, of G. Rebmann & Co., representing jobbing work.

The bids for the fourteen pieces of castings on which prices were asked by postal card were then read by Mr. L. B. Whitney. The highest and lowest prices given as well as the average are as follows:

	Highest.	Lowest.	Average.
No. 1, weighing 12 lbs.	4c	1¾c	2 43-100c
No. 2, " 60 lbs.,	3c	2c	2½
No. 3, " 10 lbs.,	3c	1¾c	2 13-100c
No. 4, " 15 lbs.,	3c	1¾c	2 33-100c
No. 5, " 17½ lbs.,	3c	2c	2 44-100c
No. 6, " 8 lbs.,	3c	2c	2 45-100c
No. 7, " 27 lbs.,	3c	1¾c	2 29-100c
No. 8, " 4 lbs.,	4c	2¼c	3c
No. 9, " 11 lbs.,	4c	2½c	3 32-100c
No. 10, " 5 lbs.,	4c	1½c	2 37-100c
No. 11, " 1⅛ lbs.,	5c	2 3-10	3 48-100c
No. 12, " 1¼ lbs.,	7c	2¼c	3 79-100c
No. 13, " ⅛ lb.,	8c	2¾c	4 57-100c
No. 14, " 7⅛ lbs.,	6c	2 5-16c	4 38-100c

There were only fourteen bids received on these castings out of 500 inquiries, which is a much smaller percentage than was expected. It was moved and seconded, therefore, that we discontinue the presentation of castings and asking for bids.

Mr. Jones Wister then entertained the association by a very instructive address on the subject of "Coke compared with Anthracite Coal for Foundry Use," stating that from the fact that one cubic inch of coke contained about 55% of air cells and coal virtually none. That coke was the best fuel, as it allowed the oxegen of the blast to penetrate the cells, making quicker combustion, which would run down the iron in about half the time that would be required in using coal. That they both would contain about the same per cent. of heat units and the quality of iron would be about the same in either case. He also stated that the cupola tender had much to do with the successful operation of the cupola, as it might be possible to run poor heats with a good quality of coke and vice versa. He also stated how good coke could be determined from bad coke by ordinary inspection, and recommended that purchasers should examine their coke before unloading it and if not found to be up to standard should notify the seller and have it corrected before it was unloaded.

Mr. Jones spoke in favor of the Connellsville coke, stating that the seams of coal in the Pittsburg and Connellsville regions were better adapted to making coke than that found in other sections of the country.

Mr. Wm. M. Winks of the Davis Coal & Coke Co., from Virginia, described the coke made by their company, stating that it contained less quantity of sulphur than was found in other sections, averaging less than quarter of one per cent., and that they were shipping it as far north as Boston, and south to Mexico.

A general discussion then took place regarding fuel and the amount of blast used in cupolas, a number of those present taking part. The following is about the price at which fuels are selling f. o. b. car at Philadelphia:

Connellsville coke, $4.45 per net ton; good quality anthracite coal, $4.45 per gross ton; gas house carbon, $6.50 per net ton; tar coke, $5.50 per net ton.

A vote of thanks was extended to Mr. Wister for the very able manner in which he handled the subject and his address will be published in the *Iron Age*, THE FOUNDRY, the *Iron Trade Review* and the *Tradesman*.

This meeting was a very successful one, those

present stating they were well pleased with the proceedings. Our association may be congratulated at this time, as its members are increasing and the information which it has procured has been of much value to all foundrymen. The meeting then adjourned.

HOWARD EVANS, Secretary,
Pier 45, North Delaware avenue,
Philadelphia, Pa.

It gives me great pleasure to be the guest of your association, and I desire to thank you cordially for being willing to listen to a subject which so deeply interests all of us. Having been a manufacturer of metal for so many years gives me an opportunity to explain some of the difficulties which surround the furnaceman, whose whole desire is to sell the foundryman a metal which will best suit his wants. The fuel used in the smelting of the ores has the greatest bearing upon the results.

In the year 1867, J. & J. Wister built a blast furnace in Harrisburg, which was then and still remains, one of the best manufacturing sites in Pennsylvania.

Anthracite furnaces at that time made from 15 to 25 tons of pig iron during every day of 24 hours. Ours was expected to make 16 tons daily, but exceeded the limit until 20 tons became the daily average. At the end of the fourth year we had earned more than enough to pay for the plant, and our firm had an enviable reputation is the business world. Anthracite from either the Schuylkill or the Wyoming region was our only fuel.

I was the business manager only, and employed a founder to work the furnace, who, after the fashion of the "rule of thumb" times, was a superior furnaceman.

Things were working smoothly, pig iron was in great demand, and we had just made a contract for 5,000 tons of No. 3, No. 2, and No. 1 iron at $42, $44 and $46, respectively, when on the 17th of September, 1873, the great banking firm of Jay Cooke & Co., failed. We were out of blast at the time but after repairing we blew in and filled the 5,000 ton contract at a handsome profit.

The times, however, had undergone a complete change since we had been in the market, and when we again had metal for sale at a high price the buyers had disappeared.

Other changes were going on in the iron trade, especially west of the Alleghenies. The Lake Superior ores were coming into the Pittsburgh and the Shenango markets in large enough quantities to keep the price of metal in that important market lower than the makers cared to see it. Furnaces, which, like our own, had been built to smelt 20 tons per day, were turning out 50 tons per day; others built five years later were expected to make 75 tons or, perhaps, even more, but when reports came that a furnace in Pittsburgh was making a daily output of 100 to 125 tons many declined to believe such a wild statement.

The constant decline in metal values from month to month and from year to year brought about great economies in furnace practice which the years of prosperity and high values would never have accomplished. The year '76 brought the centennials, '77 the railroad riots, while '78 brought coke from the West to stimulate our slow anthracite fires, for, by this time it had become apparent to many of us that at our then rate of speed, we were out of the race.

Among the economies practiced by our firm was to dispense with the founder, who had not kept pace with our requirements. I had taken a course in chemistry and conducted many chemical experiments, and had learned to analyze ores, limestone and metal which, together with the necessity of constantly watching the founder, led the firm to try the experiment of working the furnace through the office. One of our first moves, after the large yields in the western furnaces had become established, was to experiment with coke. This we did in a small way at first, but after establishing confidence in the fuel we continued its use from one-quarter to one-half of the furnace charge as long as we continued in business. During the last two or three years of our history we had increased the yield of our furnace to a daily average output of about 40 tons, which on many days reached 45 to 50 tons, or about three times as large a tonnage as we had expected when we built. Coke played a very important part in causing this increased yield.

Furnaces between the years 1868 and 1873 consumed one and one-half to two tons of fuel per ton of metal produced. At the present time few furnaces burn more than one and one-quarter tons of fuel per ton of metal, while the best practice shows ninteen hundred weights to ton of output. In cupolas the best practice has shown ten tons of metal melted per ton of fuel. It therefore, follows that even to-day when the best practice ever known in furnaces is being shown that the furnaceman is ten times more interested in fuel than the foundryman, who burns only one pound in ten, or in

everyday work, perhaps, 1 to 6, 7 or 8 is nearer the truth.

The cupola is a diminutive blast furnace, requiring the stimulant of rapid combustion as much as, and perhaps more, than the furnace. The virtue of conservatism has prevented some foundrymen from using coke, while the lack of the knowledge of the real advantage of coke as a fuel has prevented others.

Coke being a manufactured article is subject to many irregularities, which many foundrymen have, no doubt, discovered to their cost. These irregularities arise from various causes.

1st. The general character of the coal of the region used in its manufacture.

2d. The character of the particular coal used, if in its normal condition or reduced in value by sulphur, slate, or ash.

3d. The burning of the coal into coke after being dumped into the ovens.

4th. The amount of water absorbed through weathering.

Coking coals exist in Pennsylvania from the East broad top region to the Ohio border. The semi-bituminous coals carrying a minimum quantity of about 15% of bitumen or volatile matter; the mountain coals carrying about 20% of bitumen or volatile matter, and the Pittsburgh seam, which embraces the Connellsville and gas coals, carrying the maximum amount of about 30% to 35% of bitumen or volatile matter. Coke from all these regions is used by foundrymen, but that from each region has its own peculiarities. Beginning at the east the coke from these various coals for foundry use, may be said to be good, better, best. Of the coke made from the Pittsburgh seam, the Connellsville is so pre-eminently superior to all others that it is frequently complimented by imitations, which salesmen do not always allude to when offering their coke to customers.

Good results in either cupola or blast furnace practice depend upon the character of the fuel. Foundrymen expecting to realize the advantage which can be obtained from the use of coke should examine each shipment before using, and a careful study of fuel is not only interesting from a business standpoint, but will be found full of pleasure for the scientific mind. Buyers should therefore make a personal examination of every car of coke if they expect good results. Mountain, or even broad top coke may not be a bad substitute for Connellsville, provided the coal used is the best product of the mines and the burning has been perfect, but, all other things being equal, Connellsville is the best coke for foundry practice.

The appearance of a good article of fresh burnt coke should be a dark shining gray mass. Examined more closely the fracture of the cross section is found to be honeycombed with air cells from the size of a pin point, increasing up to the size of the head of a large toilet pin, while upon the longitudinal surface it will be found that the intense heat which permeates the seams of the burning mass has caused the bitumen and other easily melted material in the coal to run over the surface, covering it with a beautiful gloss in some parts and with shining beads in other parts. At the base of each oven of burnt coke will be found a small amount of what is known in the trade as "smuty coke" or only partly burned coke which should not extend over one-half to one inch up the mass and then only on the surface. These are the general features of every good coke, nor do we believe it makes much difference what region a thoroughly well-burned coke emenates from, for it will answer its purpose equally well.

The increased cost of manufacturing a perfect coke from coal not adapted to that use, causes almost all the owners of such coals to market them as coal rather than invest a large amount of money upon a manufacture, the nature of which is hazardous. The failures come chiefly from a lack of bitumen to perform the coking service within the time necessary to make it a commercial success. A series of experiments looking to the making of coke from anthracite culm was tried some years ago by the writer, the results of which show that by the addition of 7½% to 10% of raw bitumen (such as is produced in gas retorts) an unsatisfactory coke could be made; 15% improved it, while 20% made a splendid hard coke which would scratch glass. It may also be interesting to know that one-half anthracite culm and one-half of any gas coal mixed and burnt will produce a coke of superior quality, but at a cost far beyond its commercial value.

The buyer should also know the characteristics of second quality and also of distinctly bade coke. If the general character of the coal from which the coke is baked is slatey the cross fracture will invariably show any slate which the mass contains. As slate and coke are of almost the same color it is absolutely necessary to make the fracture or else it is not

likely to be discovered, except by the loss of heat units in the cupola.

If slate occurs only in minute pieces and not in large numbers the buyer has no just cause for complaint, as coal is scarcely ever entirely free from slate. If, on the contrary, the pieces of slate are frequent and of large size, varying from that of the thumb down to pieces the size of a grain of corn and the fracture of many pieces show the same bad qualities, the buyer would be justified in rejecting it or asking for a reduction.

All fuel, whether anthracite or coke, contains from 8% to 10% of ash. If slate predominates in the ash, the buyer secures a given quantity of Alumina. This, some foundrymen, pay high prices for in the metal aluminum, which, if used in proper proportions as a flux, increases the fluidity of the iron melted and requires a less proportionate amount of fuel for melting purposes.

Sulphur is, perhaps, the worst ingredient which coke contains, for it not only forms an alloy with the metal, but changes the graphitic carbon into combined carbon (which is only another name for "hardening") and also reduces the heat of the flame by its presence. If the fires of Sheol are fed by sulphur, as some writers lead us to believe, certainly furnacemen and foundrymen need have no fear of them, for the coldest substance they meet in their daily struggle for supremacy is sulphur, as it chills everything like iron with which it comes into contact. There is a rumor on the Democratic side of the street that sulphur, cold as it is, is hot compared with the Cleveland "cold shoulder" given to the anti-snappers. Sulphur cannot be discovered in coke by eyesight. It therefore, behooves the user to inquire about the analysis of the coke (as well as the pedigree of the coke baker) whether it is a 48 or 72 hour baby; whether its crematory remains are red, gray or white; also after it is bought, whether there is a locomotive on the entire system strong enough to pull it to market, and further, whether the said locomotive will not confiscate it for its own use en route

These remarks may all be said to be the simple rule of thumb methods of the trade by which it learns to defend itself against the ubiquitous and iniquitous coal man. But there is a scientific principal underlying the practical and growing out of it which the chemist and investigator has given to the world through the American Institute of Mining Engineers. One of these gentlemen, Prof. John A. Church, E. M., of Columbus, Ohio., entered upon the search for reasons why coke was better than anthracite as a fuel and discovered that an average piece of coke contains about 55% air cells, or in other words it is porous like moss or coral. This physical construction permits the oxygen of the air to penetrate it and causes combustion to be free and general in all its mass. Anthracite, on the contrary, though generally somewhat freer from impurities than coke, burns upon the outside only. Throw upon the floor pieces of both fuels heated to a red heat and watch the result; the anthracite will soon change its color to that of its ash and within a very short time presents no appearance of heat, while the piece of coke will continue glowing until consumed, because of its porosity. It does not waste in combustion until its duty is done. It carries its burden in the blast furnace as well as hard anthracite and better than soft anthracite, while it performs its given duty in about one-half the time. Herein constitutes its great advantage as a fuel in the blast furnace. For the cupola, its ability to carry a burden is of greater importance, for the difference in specific gravity between the charges are greater than in the blast furnace and the melting is more rapid. So every advantage that coke has over anthracite in the blast furnace is enhanced in the cupola in proportion to the difference between the specific gravity of coke, limestone and ore, and that between coke and pig iron.

These remarks would seem to indicate that if rapidity of combustion is wanted in a cupola, pure coke can be depended upon to provide it. The foundryman must, however, reply upon his own judgment as to whether he requires rapid combustion or not. He may, however, be sure of one fact, proved beyond peradventure or doubt by the good and bad working of blast furnaces, as observed by hundreds of furnacemen, viz., that fuel which will best withstand the loss by combustion, which is constantly going on through the descending column of fuel, iron ore and limestone in the blast furnace or of fuel oyster shells (or whatever flux may be used) and iron in the cupola is the standard fuel for either furnace or cupola use, for it reaches the area in front of the tuyers in the best condition for rapid ignition. In furnace practice east of Harrisburg, that fuel has been found to be a mixture of one-third to one-half coke and the remainder hard anthracite. This standard has been arrived at from a combina-

tion of physical and commercial conditions.

Having given you the most salient and interesting points upon coke, perhaps a few remarks upon anthracite as a heat producer may be in order.

No experiments have ever been tried, either by others or myself, which have shaken my faith in the fact that one pound of the best anthracite contains fewer heat units than one pound of any other fuel in existence. But we live in a progressive age, and all experiments prove that notwithstanding the existence of the heat units in anthracite so large a proportion of them remain latent that for the purposes of the furnace or foundryman they might as well not be there. When the differences of blast pressure used in furnaces and cupolas (which for practical purposes may be taken as 7 to 1) is considered, the advantage of a fuel easily penetrated by the blast are enormously in favor of coke.

Many will wonder why the coke made from a highly bituminous and volatile coal is so superior to that made from coal low in volatile. The first thought would be that the higher a coal is in volatile matter the greater the waste in the production of coke. The results do not prove this to be true, but on the contrary do most conclusively prove that low volatile coals produce cokes of least value from an analytical stand point, yet from a physical standpoint the high volatile coals produce coals which are best suited to the wants of those who melt and smelt.

I have never seen an analysis of a coal in which bitumen and volatile were noted separately, nor can a chemist properly take cognizance of the two substances. Yet the coal tar of commerce, made at every gas works in large quantities, is a proof that though it is volatile yet it returns to the liquid form in quantities large enough to become a source of revenue to all companies who distil gas from coal. If this substance exists in a coking coal in larger quantities than that demanded for coking the mass, it remains within and permeates it and itself burns into a coke of a character much more solid and compact than coke made from low volatile coals, thereby increasing the solidity of the entire mass.

This is the predominating characteristic of coal from the Pittsburgh seam and gives to coke made from it the high value which has made it a commercial standard.

It was our custom to purchase the burnt out retorts from the Harrisburg Gas Works, which were hauled to our works before being broken. An extremely hard dense coke was found in these retorts, which attached itself to the iron and was almost as hard as anthracite coal, but of a tough, solid nature. It is known at gas works as carbon. Foundrymen have used it and I am told it once had, and perhaps now has, a high commercial value. It was coke made from the bitumen of the coal and not from the so-called fixed carbon. Fixed carbon has great value for all purposes for which coal can be used, with the single exception of coke baking. If it were equally valuable for making coke, then every coal of high or low volatile would be equally excellent for that use. But no! the high volatile coals alone make the superior cokes.

This feature has not, as far as I am aware, ever before been noticed. The facts are all recognized, but if this application of them has ever before been presented it has not been my good fortune to have met with it. Should this suggestion prove correct I most cordially thank your association for inviting me to participate in your meeting, for though the whole scientific world of coal miners and users have been investigating the values of cokes made from widely different seams of coal, no one of them has been able to point out the reason why Connellsville is better than almost any other.

Nor do I make the claim, but beg to show you specimens of various cokes and to point their difference of value, thereby emphasizing my suggestions, and I hope that it will lead to some scientific research by which they may be either thrown aside or established.

EXHIBITS.

Crystalline Anthracite Coke, made from coal tar; Nigger Head Anthracite; Coke made from Pittsburgh seam at Latrobe; Connellsville Coke from Dunbar; Slatey Coke, location not stated; Charcoal.

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MARKET REVIEW.

REPORTED EXPRESSLY FOR "THE FOUNDRY."

CINCINNATI.

February 4, 1893.

The condtions of the iron market remain weak and unsettled. Transactions are slowly increasing in volume, but there is no strengthening in prices. Statistically, the situation is strong enough, but sentimentally it is weak. Northern furnacemen are counting upon materially lower prices for ore, growing out of the Mesaba range developments. It is claimed that the soft, fine ore of the new district has been successfully tested, and can be run alone in usual blast furnace practice. Well informed ore men state, however, that the amount of ore brought down from Mesaba the coming season will be very much less than anticipated, and that it will form a less important factor in making prices than is commonly supposed. The ore men are not pressing sales, and the whole situation is a waiting one. Bessemer iron has reached its lowest point, and certain furnaces have indicated their intention to stop making it unless cost can be materially reduced.

So far as can be seen there is no material curtailment of consumption by foundries or mills. Complaint of light trade is heard in some quarters, but the actual melt keeps up about to its normal proportions. If there is no further falling off, a more liberal buying movement must begin soon. The public statement that President Cleveland will insist on the repeal of the Sherman Act is having a tendency to restore confidence in the money situation. Money remains easy at most centers, but there is no lowering of rates. Generally the range of prices for iron during the week has not changed compared with the week previous.

We quote for cash f. o. b. cars Cincinnati :

Southern Coke, No. 1, F dry	$13 50 to $14 00
" " No. 2, " and No. 1 Soft,	12 25 to 12 75
Hanging Rock Coke, No. 1	15 50 to 16 00
" " Charcoal, No. 1	18 50 to 19 50
Tennessee Charcoal, No. 1	16 00 to 16 50
Jackson Co. Stone Coal, No. 1	16 00 to 16 50
Southern Coke, Gray Forge	11 25 to 11 75
" " Mottled	11 00 to 11 25
Standard Alabama Car Wheel	18 00 to 19 00
Tennessee " "	17 00 to 17 50
Lake Superior " "	17 50 to 18 00

Rogers, Brown & Co.

CHICAGO.

February 4, 1893.

The pig iron market during the past week has shown a tendency toward weakness, and buyers are evidently holding off with the expectations of buying at lower figures a little later, consequently business placed has been small, and only to cover immediate needs.

The heavy weather continues to interfere with prompt delivery and many consumers have been very much annoyed, and in some cases works have been closed on account of lack of iron.

We quote for cash f. o. b. Chicago:

Southern No. 1 Soft	$13 60 to $13 85
Southern No. 2 Soft	13 10 to 13 35

Rogers, Brown & Merwin.

BOSTON.

February 10, 1893.

February opens up with a fair amount of orders coming in, although prices are hardly as firm, as the demand for iron would seem to warrant.

Foundrymen, as a whole, are quite busy, but are carrying small stocks, and it appears to us, that should the furnacemen advance prices, it would have a tendency to create quite a buying movement.

We quote for cash delivered Boston :

Standard Alabama No. 1 Foundry	$15 50 to $16 00
" " " 2 "	14 50 to 15 00
" " " 3 Foundry	14 00 to 14 50
" " " 1 Soft	14 50 to 15 00
" " " 2 Soft	14 00 to 14 50
" " C. C. Car Wheel	20 00 to 20 50
Strong L. S. Coke Iron No. 1 Foundry	17 00 to 17 50
" " " " " 2 "	16 25 to 16 75
Lake Superior Charcoal Car Wheel	19 50 to 20 00
American Scotch (Northern) No. 1	17 00 to 17 50
" " " No. 2	16 25 to 16 75

Rogers, Brown & Co.
F. G. Gibbs, Resident Agent.

ST. LOUIS.

February 4, 1893.

There have been several good sized orders placed during the past week for southern irons at prices ranging fully 25 per cent. below what the majority of the southern furnaces are asking.

The foundries all seem to be fairly active and are not placing their orders for very large amounts of iron, as the cutting of prices that has recently been going on has weakened their opinion of the market, and they are now waiting to see how low prices will go.

We quote for cash f. o. b St. Louis :

Southern Coke, No. 1	$14 25 to $14 50
" " No. 2	13 00 to 13 25
" " No. 3	12 25 to 12 50
" Gray Forge	12 00 to 12 25
" Charcoal No. 1	15 50 to 16 00
Missouri " No. 1	14 00 to 14 50
Ohio Softeners	16 50 to 17 00
Lake Superior Car Wheel	17 50 to 18 00
Southern " "	18 25 to 18 50
Frick's Connellsville Foundry Coke	5 65

Rogers, Brown & Meacham.
J. K. Pollock, Manager.

BUFFALO.

February 4, 1893.

While prices still continue weak, inquiry is rapidly going on, and some good size sales are being consummated. Consumption is apparently growing and forcing purchases. The present demand for iron if continued will certainly stop further decline in prices, if indeed it does not cause a sharp advance.

We quote for cash f. o. b. Buffalo.

No. 1 X Foundry, Strong, Coke Iron, Lake Superior ore	$15 00
No. 2 X Foundry, Strong, Coke Iron, Lake Superior ore	14 00
Ohio Strong Softener No. 1	15 00
Jackson County Silvery No. 1	$17 00 to 17 30
Lake Superior Charcoal	17 25
Tennessee Charcoal	18 00
Southern Soft No. 1	$13 90 14 15
Alabama Car Wheel	19 00
Hanging Rock Charcoal	20 50

Rogers, Brown & Co.
W. T. Shepard, Mgr.

PHILADELPHIA.

February 4, 1893.

We have considerable business to report this week in the way of orders for mill and foundry irons, but at prices that would keep new furnace from blowing in, and that surely will cause some of those who are now in full blast to blow out, unless there is a revival at some near future date.

The consumption of iron and steel is very heavy, and users of same seem to universally have plenty to do.

We quote for cash f. o. b. cars Philadelphia.

Standard Ala. No. 1 X	$15 25 to $15 50
" " No. 2 X	14 25 to 14 50
Embree or Equivalent, No. 1, X	15 25 to 15 50
" " No. 2, X	14 25 to 14 50
Strong Lake Ore Coke Iron, No. 1 X	16 50 to 17 00
" " " " " No. 2 X	15 50 to 16 00
Lake Superior Charcoal	18 50 to 19 00
Standard Alabama C. C. C W	20 50 to 21 00

Rogers, Brown & Warner.

NEW YORK.

February 4, 1893.

Since our last, we have to report some little signs of improvement. Inquiries are more numerous, which we expect will result in buying in the near future.

We quote for cash f. o. b. New York.

No. 1 Foundry, Lake Ore, Coke Iron	$16 00 to $16 50
No. 2 " " "	15 00 to 15 50
No. 1 American-Scotch	16 00 to 16 50
No. 2 " "	15 00 to 15 50
No 1 Standard Southern	15 00 to 15 25
No. 2 " " and No. 1 Soft	14 00 to 14 50
Standard Southern Car Wheel	20 00 to 21 00

Rogers, Brown and Warner.

DETROIT.

February 4, 1893.

While there has been considerable buying during the past month, both of Coke and Charcoal Iron, we cannot report any increase in price, but on the contrary, Southern Iron has been sold at lower prices than ever. Most of the cutting has been done on low grades of iron, and by furnaces who have large stocks on hand and were obliged to dispose of it. The stronger furnaces are not willing to make any reductions from prices that have been ruling for some time past, and also on Charcoal Iron there has been no weaking in price. Ohio furnaces are able to make prices low enough to secure considerable trade, and are fighting with Southern furnaces for the business. With more inquiry and prospects for better business, we quote the market as follows:

Lake Superior Charcoal, all numbers	$16 50 to $17 00
" " Coke Bessemer	15 00 to 15 50
" " Coke Foundry, all ore	13 25 to 16 75
Standard Ohio Black Band (40 per cent.)	16 00 to 16 50
Southern No. 1 Foundry	14 50 to 15 50
" No. 2 Foundry	13 85 to 14 00
" No. 2 Soft	13 50 to 14 00
" Grey Forge	12 50 to 13 00
Jackson County Ohio Silvery	17 50 to 18 00

Wm. F. Jarvis & Co.

LOUISVILLE.

February 4, 1893.

There is a strong feeling that it will be necessary for lower prices to be made, and buyers claim that concessions have been made on all grades; No. 1 Foundry being offered on basis of $10.50; Birmingham and Grey Forge $8.50, and a number of transactions have gone through on that basis. It is unfortunate that prices have changed, as consumption is going forward on a large scale, and buyers have not been carrying stock to a great extent, but they have felt that the market was in their favor and have declined to purchase heavily, so that by delaying it has forced some furnaces who wish to make sales to offer inside prices, this has succeeded in demoralizing the market to an extent that buyers are unwilling to purchase unless concessions can be obtained, and furnaces whose position was strong enough to hold prices without change, may have to meet same. The indications are that $8.50 Birmingham, or less, for Grey Forge will prevail for some little time to come.

Car Wheel Irons are not in large demand, and prices have fallen off slightly.

We quote for cash f. o. b. cars Louisville.

Southern Coke, No. 1 foundry	$13 00 to $13 25
" " " 2 "	12 00 to 12 25
" " " 3 "	11 25 to 11 50
" " Grey Forge	11 00 to 11 25
" Charcoal, No. 1 foundry	15 00 to 16 00
" Car Wheel	17 50 to 17 75

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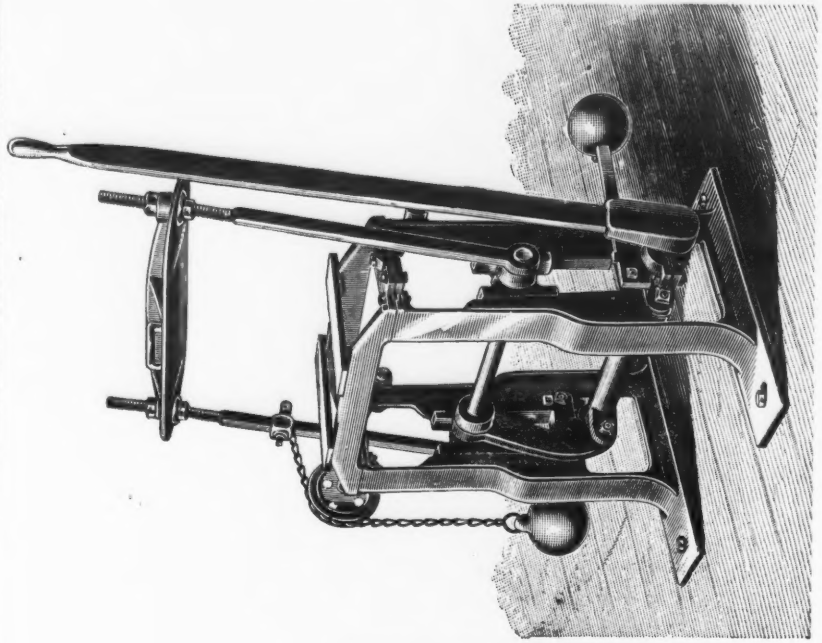

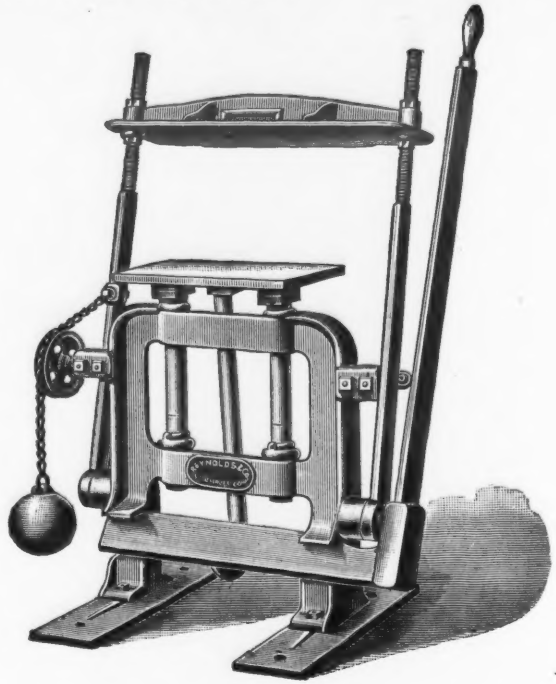

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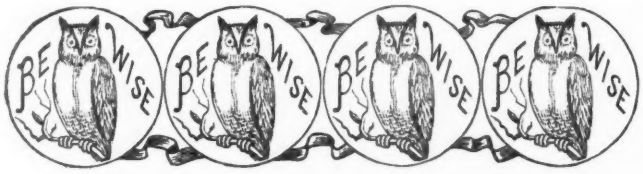

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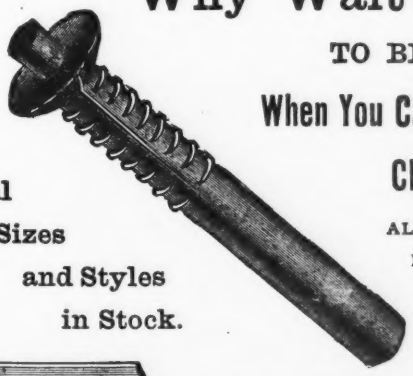

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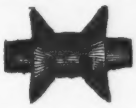

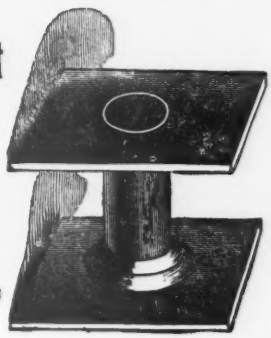

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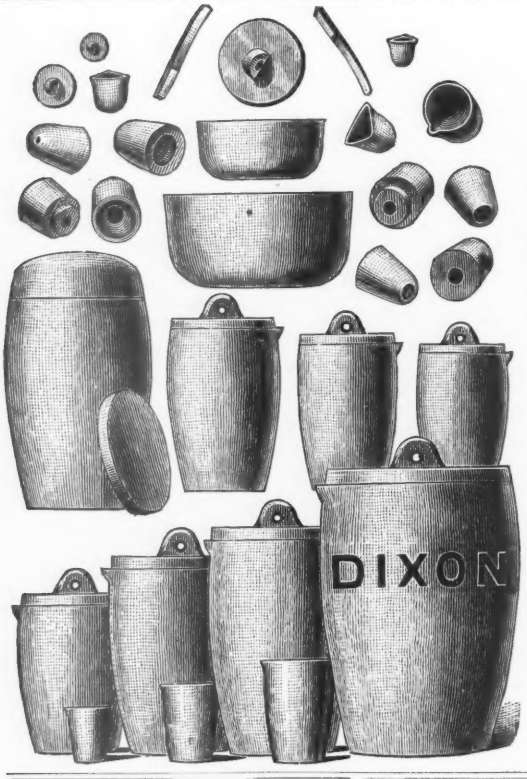

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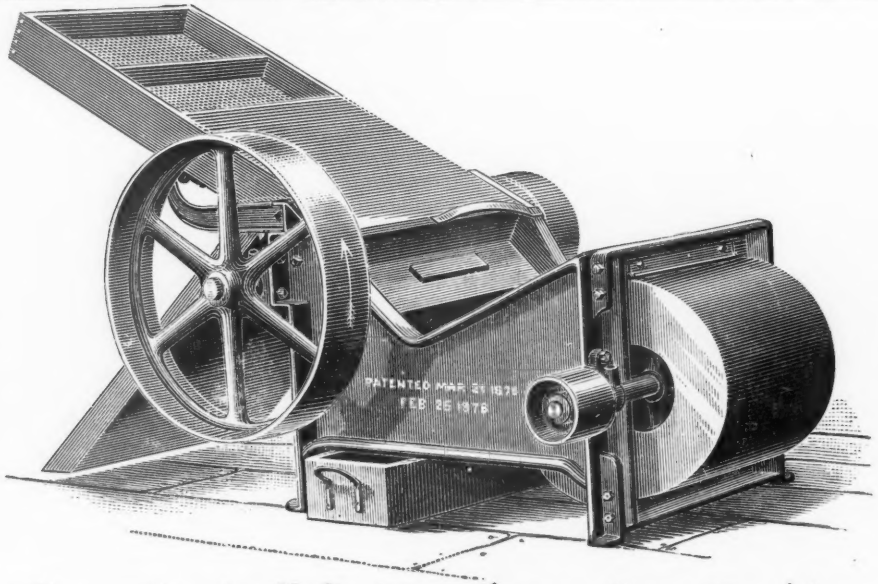

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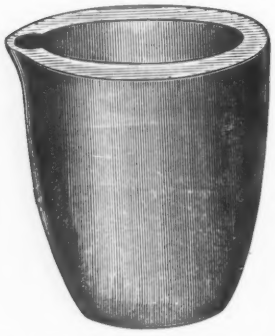

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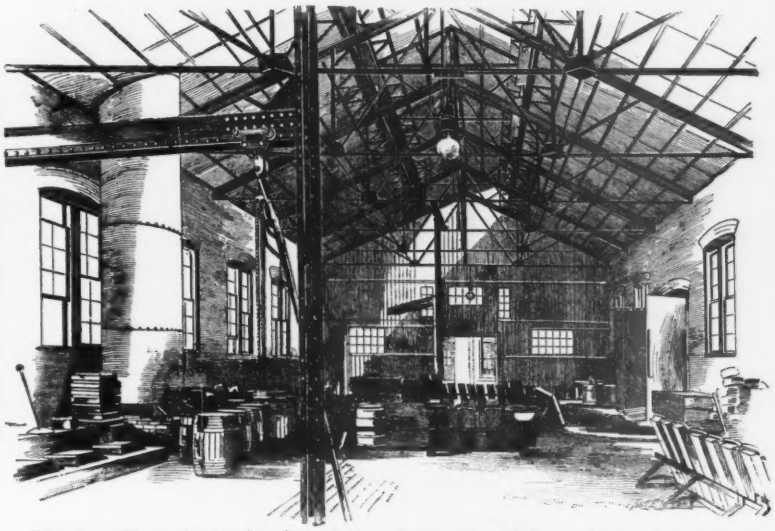

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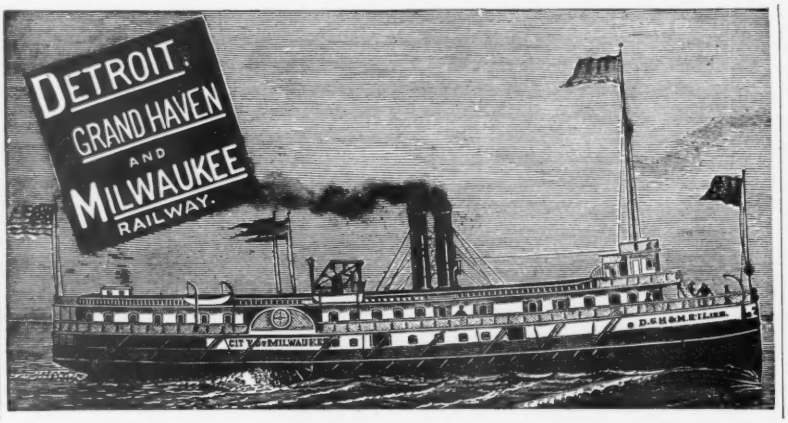
To Milwaukee, and all Points in Wisconsin, and the Northwest during the Summer Months.



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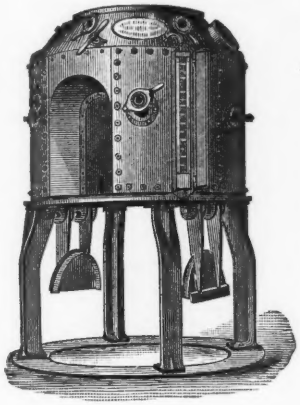

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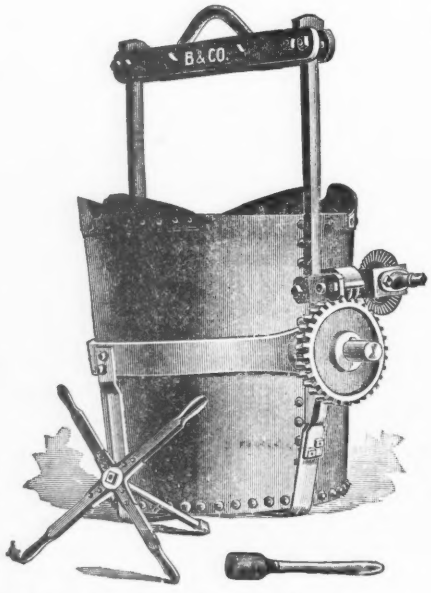

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